

# **POST-REMEDIAL MONITORING REPORT**

**APRIL 2010 EVENT**

**ARMY CREEK LANDFILL**

Prepared for:

**Army Creek Landfill Remedial Trust**

Prepared by:

**Ruth Associates, Inc.**

8 East High Point Road  
Stuart, Florida 34996  
(772) 283-0959

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# RUTH ASSOCIATES, INC.

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## **1.0 Background**

The United States Environmental Protection Agency (EPA) approved permanent suspension of the pump-and-treat operation and termination of Statement-of-Work 2 for the Army Creek Landfill (ACL), with issuance of a letter in May 4, 2009. The May 4, 2009 EPA letter approving completion of Statement-of-Work 2 is provided in Appendix A.

As a condition of this termination, a semi-annual post-remedial monitoring program is being implemented. The plan also calls for the decommissioning of the pump-and-treat system and the abandonment of the recovery and monitoring wells no longer necessary. The EPA-approved well abandonment program was completed in April 2010, and is reported separately.

The post-remedial monitoring program is outlined in the Revised Addendum to the 1992 Operation and Maintenance (O&M) Plan, prepared by Ruth Associates, Inc. (RAI) and dated October 8, 2009 (provided as Appendix B). EPA formally approved the Revised Addendum to the 1992 O&M Plan, by issuing a letter dated October 28, 2009 (provided in Appendix A).

This post-remedial monitoring program includes measurements of water levels plus monitoring of surface-water and groundwater quality. The second of these semi-annual events was conducted in April of 2010. The purpose of this report is to document the activities and results of the post-remedial monitoring program.

## **2.0 Project Team**

RAI performed water-level measurements, sample collection and field parameter measurements, and conducted the operation and maintenance activities for the new pumping well, PW-1. All laboratory analyses for the April 2010 Event were performed by Compu-Chem of North Carolina, except for the volatile organic analyses performed by Test America Laboratory in Pittsburgh, Pennsylvania. Data validation services were provided by LAB Validation Corp. RAI compiled all water-level measurements and chemical-quality data and prepared this report.

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## **3.0 Water-Level Monitoring**

Water levels were measured in monitoring wells within the vicinity of the DS&G and Army Creek Sites and at stream gauge locations along Army Creek and Army Pond. The locations of these monitoring points are shown on Figure 1.

Upon arrival at each well and prior to measuring the groundwater elevation, the sampling personnel verified the well identification number. Prior to opening the well, the sampling personnel inspected for and documented any signs of tampering or well deterioration. The depth to groundwater measurement was taken using a decontaminated electronic water-level indicator. Personnel slightly raised and lowered the probe at the water level a few times to determine the accurate point of contact. The static depth to water measurement was read directly off the markings on the tape to the nearest 0.01 foot from the surveyed reference mark, and was recorded along with the time and day of the measurement.

Surface-water elevations were measured synchronously with groundwater elevations. Staff gauges were used to measure the surface-water elevation at each of the monitoring locations. The depth to surface water was measured from the surveyed mark on each staff gauge, and recorded on the field form.

The groundwater and surface-water elevations were calculated using the depth-to-water measurements and the surveyed elevations of the measuring points. The calculated elevations are summarized in Table 1. A map depicting the inferred direction of groundwater flow in the Upper Upper Potomac is shown in Figure 2.

## **4.0 Groundwater Monitoring**

Groundwater samples were collected from seven wells: five monitoring wells specified in the long-term plan; an additional well, MW-38N, monitored for lead and field parameters; and one currently pumped well, PW-1, located immediately downgradient of Delaware Sand & Gravel's Drum Disposal Area (DS&G DDA). The April 2010 Monitoring Event was a semi-annual event. The samples were collected and analyzed

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for a variety of parameters in accordance with the EPA-approved plan (provided in Appendix B), and included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), dissolved iron, dissolved manganese, and field indicator parameters. Samples from three of the wells were also monitored for dissolved lead.

Groundwater sampling was performed using low-flow (minimal drawdown) methods, in accordance with the EPA-approved plan. The wells were purged and sampled using a dedicated submersible pump with dedicated or new high-density polyethylene (HDPE) tubing.

During well purging, the DTW, pump flow rate and field parameters were measured at intervals of three minutes or more. The pump flow rate was adjusted to limit drawdown. The first field parameter measurements were not collected until at least one volume of the pump, tubing and flow-through cell was evacuated. Field parameters included pH, conductivity, dissolved oxygen, temperature and oxygen reduction potential. Purging was considered complete when three consecutive readings met all of the following stabilization criteria:

pH	+/- 0.1 SU
Conductivity	+/- 3%
Dissolved Oxygen	+/- 0.3 mg/l
Temperature	+/- 3%
ORP	+/- 10 mV

If determined that the stabilization parameters could be met, a sample can be collected at the discretion of field personnel and documentation of this deficiency made on the log form. This conditions was not encountered during the April 2010 Event.

Once purging stabilization was achieved, the flow-through cell was detached from the pump discharge without affecting the pump flow rate. Pre-preserved sampling containers were filled directly from the pump tubing discharge. The pump flow rate was maintained at the same rate as it was during purging. Field filters were used only for the collection samples analyzed for dissolved metals samples.

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Once the requisite sample containers were filled, the tops were securely closed and the samples immediately placed on ice. The samples were delivered under chain-of-custody to the laboratory.

Every effort was made to use new or dedicated materials during sampling. In any event that this was not possible, items were thoroughly decontaminated between wells. Decontamination procedures included the use of an Alconox and de-ionized water mixture followed by a de-ionized water rinse.

The validated groundwater quality results from the April 2010 Monitoring Event were added to the database presented as Table 2, for the purposes of comparison with historic results. The historical spatial distributions of BCEE, 1,2-dichloroethane (DCA), benzene, dissolved oxygen, dissolved iron, and dissolved manganese are plotted on Figures 3 through 8, respectively.

### **5.0 Chain-of-Custody and Quality Assurance and Quality Control**

Once collected, all samples were kept under strict chain-of-custody (COC) procedures, documenting possession of the samples from collection to receipt by the laboratory. Quality assurance/quality control (QA/QC) samples were collected and analyzed in accordance with Table 3 of the EPA-approved plan (Appendix A). The analytical results for the QA/QC samples are provided in Table 3.

### **6.0 Future Activities**

The next annual monitoring event will be conducted in October of 2010. This event will include monitoring of groundwater, surface water and stream sediments. The treatment system will be maintained until January 2011, after which it is anticipated the iron treatment system will be decommissioned.

# **TABLES**

**Table 1**  
**Summary of Water-Level Elevations**  
**Vicinity of the Army Creek and Delaware Sand & Gravel Landfills**

	Pre-Suspension										Post-Suspension														
	08/27/04	09/27/04	11/09/04	01/12/05	04/22/05	07/11/05	10/24/05	01/20/06	04/21/06	07/10/06	10/06/06	01/08/07	04/20/07	07/23/07	10/09/07	01/14/08	04/14/08	07/14/08	10/20/08	01/15/09	04/17/09	10/12/09	04/12/10		
<b>Monitoring/Recovery Wells</b>																									
MW-18	--	-15.52	-18.82	--	-0.88	-10.43	-15.48	-1.48	-6.22	-11.06	-10.96	-8.47	-10.32	-13.45	-15.23	-10.21	-10.50	-14.91	-12.46	-9.84	-7.82	-12.03	-4.43		
MW-22N	-22.27	-16.54	-22.20	-17.93	-3.71	-14.10	-21.39	-3.93	-10.68	-15.60	-11.09	-14.97	-16.99	-18.22	-14.25	-15.35	-19.04	-15.94	-13.98	-11.82	-15.84	-9.50			
MW-26N	-27.35	-16.85	-27.19	-20.74	-4.03	-19.74	-24.97	-4.79	-13.27	-20.72	-17.65	-16.17	-19.06	-23.27	-24.91	-18.21	-18.78	-24.79	-19.81	-17.86	-14.03	-19.12	-11.43		
MW-28	-20.70	-16.97	-15.65	-10.25	0.46	-5.43	-11.82	-0.58	-3.59	-6.74	-8.88	-5.36	-5.23	-9.58	-11.34	-7.05	-7.14	-10.92	-9.80	-8.05	-5.69	-9.70	-1.50		
MW-29	-20.86	-18.88	-14.35	-8.62	1.11	-3.64	-8.45	0.24	-2.22	-4.78	-5.98	-3.58	-3.52	-7.10	-8.72	-6.19	-5.13	-8.01	-7.53	-6.08	-4.10	-7.42	-0.20		
MW-31	-30.95	-18.42	-12.71	-8.26	0.75	-3.50	-7.54	-0.21	-2.07	-4.40	-6.15	-3.40	-3.27	-6.36	-8.08	-4.93	-4.68	-7.15	-7.04	--	-3.75	-6.51	0.15		
MW-38N	-21.89	-16.41	-19.24	-14.25	-0.44	-10.32	-15.28	-2.08	-7.20	-11.87	-12.36	-9.29	-10.53	-13.89	-15.24	-10.70	-11.33	-15.45	-12.87	-11.23	-8.73	--	-5.50		
MW-40	-21.54	-16.76	-17.90	-12.84	-0.73	-8.76	-13.90	-1.50	-5.97	-10.23	-11.23	-7.97	-8.86	-12.47	-13.94	-9.48	-9.95	-14.03	-11.78	-10.09	--	-11.85	-4.14		
MW-49N	-24.75	-16.57	-24.64	-18.99	-3.46	-16.64	-18.41	-3.69	-11.65	-17.96	-16.12	-14.45	-16.69	-19.51	-21.19	-16.06	-16.90	-21.53	-17.32	-15.14	-12.52	-17.00	-10.23		
MW-54	-6.20	-4.31	-4.48	-1.88	5.16	2.47	0.01	5.38	3.95	2.01	1.41	3.96	3.11	1.95	0.93	2.25	2.28	0.71	0.78	1.61	2.32	0.54	6.10		
MW-56	-14.00	-11.48	-9.41	-4.84	3.36	0.04	-3.56	2.49	1.00	-0.61	-2.29	0.56	0.24	-2.27	-3.91	-1.40	-1.14	-3.26	-3.57	-2.30	-1.14	-3.45	3.59		
MW-58	-9.33	-8.02	-5.73	-2.56	2.92	1.40	-0.92	2.44	1.63	0.84	-0.59	1.49	1.64	-0.65	-2.26	-0.39	0.31	-1.28	-2.19	-1.09	-0.25	-1.84	3.58		
P-4	-21.01	-16.16	-19.53	-15.63	-2.53	-11.38	-15.90	-2.84	-8.25	-13.00	-13.69	-10.41	-11.95	-14.15	-15.12	-11.49	-12.36	-15.97	-13.69	-12.05	-9.81	-13.71	-7.05		
P-5L	-23.23	-16.21	-19.48	-16.58	-1.98	-13.20	-18.23	-3.04	-8.61	-14.03	-13.45	-11.06	-12.76	-16.42	-18.17	-12.81	-13.31	-18.03	-14.98	-12.50	-10.00	-14.50	-6.70		
P-5U	-22.08	-16.39	-18.84	-13.75	-1.31	-10.36	-15.53	-2.33	-6.88	-11.38	-11.86	-9.12	-10.13	-14.07	-15.82	-10.87	-11.21	-15.59	-13.25	-11.12	-8.64	-12.90	-5.01		
P-6	-20.44	-17.02	-15.95	-10.73	-0.53	-6.59	-11.02	-1.39	-4.37	-7.54	-8.74	-6.01	-6.25	-9.71	-11.30	-7.59	-7.50	-10.63	-9.76	-8.18	-6.19	-9.62	-2.59		
RW10	-21.96	-15.66	-16.05	-11.30	-0.17	-6.95	-11.36	-0.96	-4.59	-8.21	-9.49	-6.20	-7.06	-10.00	-11.30	-7.61	-7.98	-11.36	-9.90	-8.51	-6.47	-10.06	-2.77		
BW-1	-23.98	-16.14	-22.22	-2.26	-14.17	-19.33	-3.21	-9.38	-15.07	-14.21	-11.94	-11.87	-17.42	-19.36	-13.72	-14.32	-19.19	-15.85	-13.28	-10.66	-15.27	-7.63			
BW-2	-23.71	-16.66	-21.56	-16.00	-2.18	-13.27	-18.06	-3.07	-8.83	-14.11	-13.78	-11.28	-12.89	-14.49	-18.30	-12.95	-13.53	-18.27	-15.20	-12.80	-10.23	-14.79	-7.04		
BW-3	-22.14	-16.95	-18.90	-13.58	-1.06	-9.88	-14.96	-1.95	-6.55	-10.97	-11.88	-8.92	-9.85	-13.74	-15.34	-10.46	-10.91	-15.28	-12.74	-10.78	-8.34	-11.38	-3.46		
<b>Surface Water</b>																									
SG-1	--	2.07	--	destroyed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SG-1B	--	not installed	--	not installed	1.14	0.75	0.90	1.22	0.88	0.99	1.56	--	1.25	0.83	0.31	1.32	0.92	0.28	-0.19	0.64	-0.15	1.06	0.64		
SG-2	--	11.52	--	dry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
SG-2B	--	not installed	--	not installed	dry	dry	< 11.84	< 11.84	< 11.35	< 11.41	11.34	12.04	< 11.11	11.17	< 11.44	< 11.29	< 11.20	--	12.13	--	--	--	--		
SG-2C	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	
SG-3	--	10.60	--	10.77	dry	10.46	< 10.91	< 10.78	< 10.68	10.70	--	12.24	--	< 11.02	< 12.15	< 11.01	< 10.70	--	--	--	--	--	--		
SG-3B	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	not installed	
SG-4	--	not installed	--	not installed	1.46	1.76	1.46	--	1.66	1.50	1.93	2.50	1.66	1.42	1.43	1.67	2.38	2.39	2.32	2.72	3.29	2.28	2.56		
SG-5	--	not installed	--	not installed	1.49	1.75	1.46	--	1.44	1.19	1.64	2.26	1.29	1.02	< 0.89	1.26	2.22	2.25	1.86	2.20	--	1.75	1.96		
<b>Llangollen Supply Wells</b>																									
AWC-2	-34.12	-18.32	-24.05	-34.57	-8.72	-31.22	-32.22	-7.52	-24.37	-29.17	-27.42	-24.72	-27.02	-20.87	-19.52	-26.42	-28.37	-29.12	-21.12	-17.22	-16.62	--	--		
AWC-6	-21.49	-18.59	-26.89	-27.34	7.69	-24.99	-25.19	-7.19	-17.94	-24.39	-23.09	-24.64	-25.09	-22.09	-23.09	-25.94	-28.09	-24.39	-18.29	-18.94	--	--			
AWC-7	-21.47	-18.57	-28.22	-37.62	7.82	-35.12	-26.92	-6.92	-25.92	-25.67	-24.42	-34.42	-35.47	-34.52	-23.32	-32.02	-38.32	-36.92	-33.42	-18.82	-26.72	--	--		
AWC-G3	-47.32	-11.32	-50.87	-44.67	-5.46	-42.27	-50.66	-6.36	-39.02	-49.07	-44.47	-45.08	-46.82	-56.13	-54.77	-55.30	-64.88	-70.44	-72.74	-70.02	-76.87	--	--		
AWC-K1	-49.29	-16.84	-47.29	-42.49	-4.17	-43.47	-60.14	-5.39	-44.36	-56.39	-50.49	-48.32	-55.94	-62.42	-64.46	-56.55	-65.34	-60.64	-59.46	-57.44	-57.55	--	--		
AWC-MW2R	-33.58	-33.58	-35.84	--	-6.09	-30.24	-34.48	-7.07	-14.52	-34.37	--	-21.41	-24.87	-32.34	-32.39	-21.29	-22.61	-28.44	-27.04	--	-10.34	--	--		

Note - All water level measurements in ft. msl

-- Not measured

**Table 2**  
Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand & Gravel Landfills

Parameter	Criteria	BW-1																				
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99
<b>Non-Halogenated VOCs (µg/l)</b>																						
Benzene	5	0.5 U	0.5 U	0.7	0.7	1.0 B	1.4 B	1.0	0.5	0.5 U	0.5 U	0.2 J	0.2 J	0.2 J	0.8	0.3 J	0.8 J	1.3	0.8	0.7	0.8	1.0 B
Toluene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene (total)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Disulfide		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl-tert-butyl ether		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylcyclohexane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Halogenated VOCs (µg/l)</b>																						
Bromoform	100*	--	--	--	2 U	2 U	0.2 J	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	
Bromodichloromethane	100*	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	100*	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100*	--	--	--	1 U	1 U	0.11 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	0.5 U	0.5 U	0.7	0.7	0.6	0.5 J	0.5 J	0.4 J	0.3 J	0.2 J	0.5 U	0.5 U	0.7	0.3 J	0.5 U	0.5 J	0.6	1.0	1.8	2.1	
1,3 Chlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene (total)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	75	--	0.5 U	0.1 J	0.1 JB	0.1 J	0.4 J	0.5	0.4 J	0.4 J	0.4 J	0.3 J	0.4 J	0.6	1.2	1.6	2.0	1.1	0.9	1.1	1.0	
Chloroethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	5	0.5 U	0.5 U	0.2 J	0.3 J	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Semi-Volatiles (µg/l)</b>																						
Bis(2-chloroethyl)Ether		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2'-oxybis (1-Chloropropane)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylaphthalene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Caprolactam		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethylphthalate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Inorganics (µg/l)</b>																						
Dissolved Manganese (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Iron (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Biological Oxygen Demand (mg/l)</b>																						
<b>Field Parameters</b>																						
Temperature (Degrees Celsius)		13.9	13.5	12.3	13.4	13.8	13.3	12.0	12.8	13.6	13.0	13.2	12.2	13.1	11.0	12.9	13.4	14.1	13.5	13.4	13.4	13.6
Conductivity (µs/cm)		120	115	148	154	139	160	190	168	167	178	144	118	172	235	179	218	240	231	185	197	224
pH (standard units)		6.12	5.71	7.94	6.37	5.99	5.93	6.66	6.05	7.49	6.24	6.27	5.80	5.98	5.97	6.24	6.10	6.28	6.02	6.26	6.21	6.21
Dissolved Oxygen (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ORP (mV)		-118	88	96	140	119	72	110	84	8	107	--	-91	82	--	-44	50	--	-291	6	146.1	187.9
Water-Level Elevation (ft, MSL)		--	--	--	--	-23.79	--	--	-23.88	--	--	-20.15	--	--	--	-20.36	--	--	--	-23.50		

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

\* - 100 µg/l is the Criteria for Total trihalomethanes

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

UL - Not detected, quantitation limit is probably higher

**Table 2 (continued)**

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	Criteria	BW-1																				
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99
<b>Inorganics (µg/l)</b>																						
Nitrate Nitrogen (mg/l)	10	--	.05 U	.044 J	0.05 U	0.065 JB	0.038 J	0.05 U	0.05 U	0.05 U	0.054 JB	0.05 U	0.05 U									
Aluminum		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Dissolved Gases</b>																						
Oxygen (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethane (µg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethene (µg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Pesticides/Herbicides (µg/l)</b>																						
4,4'-DDD		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aldrin		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alpha-Chlordane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
delta-BHC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dieldrin		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan I		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan II		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan sulfate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin Aldehyde		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin Ketone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-Chlordane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor Epoxide		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methoxychlor	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toxaphene	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-TP (Silvex)	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

**Table 2 (continued)**

**Table 2 (continued)**

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

○ - Analyte was not detected  
↓ - Estimated concentration

K - Analyte present, reported value may be biased high

R - Analyte present, reported value may be biased high.  
L - Analyte present, reported value may be biased low.

\* - 100 mg/l is the Criteria for Total trihalomethanes

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

UL - Not detected, quantitation limit is probably higher

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

R - Data Rejected

- exceedances shaded

Table 2 (continued)

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	Criteria	BW-1 (continued)																														
		9/99	12/99	3/00	7/00	10/00	12/00	4/01	7/01	10/01	1/02	4/02	7/02	10/02	1/03	4/03	7/03	10/03	1/04	4/04	7/04	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07
<b>Inorganics (µg/l)</b>																																
Nitrate Nitrogen (mg/l)	10	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.10 U	--	--	--	0.295	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U		
Aluminum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Arsenic	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.7 U	2 U	3.9 U	1.6 U	2.8 U	2.6 U	2.2 U	2.2 U	2.8 U	--			
Barium	1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	52.9	49.6	44.4	51.3	51.5	48.7	52.0	49.3	--	--			
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Calcium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Calcium, Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20700	19800	16900	--	--	--	--	--	--	
Cadmium	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	0.2 U	0.40 U	0.20 U	0.40 U	0.20 U	0.20 U	0.40 U	--	--			
Chromium	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1 U	0.6 U	0.50 U	0.60 U	0.50 U	0.40 U	0.60 U	0.30 U	--	--			
Cobalt	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Lead	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6 U	1.2	2.0 U	1.0 U	1.9 U	1.6 U	1.2 U	2.4 U	--	--			
Magnesium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Magnesium, Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7870	6600	5860	--	--	--	--	--	--	
Mercury	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1 U	0.1 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	--			
Nickel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Selenium	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.5 U	4.3 U	4.6 U	1.8 U	2.2 U	2.5 U	2.1 U	2.7 U	--	--			
Silver	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 U	0.2 U	0.70 U	0.50 U	0.30 U	0.50 U	0.40 U	1.2 U	--	--			
Sodium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Alkalinity, Total (mg/l as CaCO <sub>3</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
<b>Dissolved Gases</b>																																
Oxygen (mg/l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.32	< 1.00	--	--	--	--	--	--	--	--	--		
Methane (mg/l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	54 JB	33 DL	--	--	--	--	--	--	--	--	--		
Ethane (µg/l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	13	--	--	--	--	--	--	--	--	--		
Ethene (µg/l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05 JB	2 U	--	--	--	--	--	--	--	--			
Carbon Dioxide (mg/l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--	--	--	--	--	--		
<b>Pesticides/Herbicides (µg/l)</b>																																
4,4'-DDD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
4,4'-DDE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
4,4'-DDT	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
Aldrin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
Alpha-Chlordane	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
delta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
Dieldrin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
Endosulfan I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.0044 J	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
Endosulfan II	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
Endosulfan sulfate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
Endrin	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
Endrin Aldehyde	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
Endrin Ketone	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--			
gamma-BHC (Lindane)	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
gamma-Chlordane	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011 JN	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
Heptachlor Epoxide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.01 U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--			
Methoxychlor	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.095 U	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	--	--	--	--			
Toxaphene	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1 U	1 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--
2,4-D	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--
2,4-TP (Silvex)	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1 U	1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

N - Analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

Table 2 (continued)

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	Criteria	MW-40																				
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99
<b>Non-Halogenated VOCs (µg/l)</b>																						
Benzene	5	0.5 U	0.5 U	0.4 J	1.0	1.2 B	0.8 B	0.5	0.2 J	0.5 U	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Toluene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Ethylbenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Xylene (total)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Butanone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Acetone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon Disulfide		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cyclohexane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Isopropylbenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methyl-tert-butyl ether		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylcyclohexane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4-Methyl-2-pentanone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
<b>Halogenated VOCs (µg/l)</b>																						
Bromoform	100*	--	--	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	
Bromodichloromethane	100*	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Carbon Tetrachloride	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Chlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chloroform	100*	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Chloromethane		--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Dibromochloromethane	100*	--	--	--	1 U	1 U	0.15 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	5	120	40	48	69	98	30	14	1.9	0.7	0.3 J	0.5 U	0.5 U	0.3 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.1	0.3 J	
1,3 Chlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,1-Dichloroethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,2-Dichloroethene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
trans-1,2-Dichloroethene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
1,2-Dichloroethene (total)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,3-Dichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,4-Dichlorobenzene	75	--	0.5 U	0.2 J	0.2 JB	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	0.3 J	0.3 J	0.1 J	0.1 J	0.1 J	0.1 J	0.1 J	0.1 J	0.1 J	0.1 J	
Chloroethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Tetrachloroethene		0.5 U	0.5 U	0.2 J	0.3 J	0.4 J	0.2 J	0.5 U	0.1 J	0.5 U	0.2 J	0.4 J	1.7	0.9	0.6	0.7	0.9	0.8	0.7	0.8	0.7	
1,1,1-Trichloroethane	200	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Trichloroethene	5	0.5 U	0.6	1.7	2.4	2.6	1.1	0.4 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Vinyl Chloride	2	0.5 U	0.5 U	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
1,2,4-Trichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,3-Dichloropropene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylene Chloride		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Trichlorofluoromethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
<b>Semi-Volatiles (µg/l)</b>																						
Bis(2-chloroethyl)Ether		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Bis(2-ethylhexyl)phthalate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2,2'-oxybis (1-Chloropropane)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2,4-Dimethylphenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Methylphenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4-Methylphenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Acetophenone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Caprolactam		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Diethylphthalate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
N-Nitrosodiphenylamine		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Naphthalene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Phenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
<b>Inorganics (µg/l)</b>																						
Dissolved Manganese (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Iron (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
<b>Biological Oxygen Demand (mg/l)</b>																						
<b>Field Parameters</b>																						
Temperature (Degrees Celcius)		15.5	13.2	13.1	13.5	13.6	15.4	12.2	13.3	12.8	12.9	12.9	13.0	11.0	12.9	13.3	14.4	13.3	13.3	13.3	13.8	
Conductivity (µs/cm)		200	192	219	243	243	601	188	163	158	145	131	136	177	173	128	138	146	149	135	133	151
pH (standard units)		6.04	6.03	6.61	6.35	6.40	6.59	6.64	6.17	6.69	5.73	6.97	5.95	6.13	5.61	5.66	5.71	5.42	5.25	5.21	5.23	5.27
Dissolved Oxygen (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
ORP (mV)		-94	-55	-34	5	-36	-54	9	90	13	26	--	-21	-52	--	74	122	--	-56	96	258.9	262.4
Water-Level Elevation (ft, MSL)		-18.94	--	--	--	-24.77	--	--	-23.68	--	--	--	-19.27	--	--	-21.18	--	--	--	-23.60	--	--

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

\* - 100 mg/l is the Criteria for Total trihalomethanes

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

UL - Not detected, quantitation limit is probably higher

**Table 2 (continued)**

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	Criteria	MW-40																				
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99
<b>Inorganics (µg/l)</b>																						
Nitrate Nitrogen (mg/l)	10	--	0.5 U	0.11	0.22	0.37	0.877	1.49	2.17	1.97	2.26	2.37	2.79	2.41	2.54	2.65	2.38					
Aluminum		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Dissolved Gases</b>																						
Oxygen (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethane (µg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethene (µg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide (mg/l)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Pesticides/Herbicides (µg/l)</b>																						
4,4'-DDD		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aldrin		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alpha-Chlorodane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
delta-BHC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dieldrin		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan I		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan II		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan sulfate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin Aldehyde		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin Ketone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-Chlorodane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor Epoxide		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methoxychlor	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toxaphene	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-TP (Silvex)	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

**Table 2 (continued)**

**Table 2 (continued)** Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand & Gravel Landfills

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

\* - 100 mg/l is the Criteria for Total trihalomethanes

Criteria are Groundwater concentrations specified in

UL - Not detected, quantitation limit is probably higher

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

### B - Analyte Detected in Method Blank

### R - Data Rejected

- exceedances shaded

**Table 2 (continued)**

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

N - Analysis indicates the presence of an analyte for which

N = Analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

Criteria are Groundwater concentrations specified in the Consent Decree for compliance at the Boundary Wells - exceedances shaded

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

**B - Analyte Detected in Method Blank**

**B. Analyte Detected in Methylated Blank**  
Evidence to make a "tentative identification"

ability to make a tentative identification.

**Table 2 (continued)**

**Table 2 (continued)**  
Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand & Gravel Landfills

-- Not analyzed or data not available to RAI as of May 6, 2010

-- Not analyzed or data not available to RAI as of May 11 - Analyte was not detected above the reporting limit

U - Analyte was not detected  
| - Estimated concentration

K - Analyte present, reported value may be biased high.

R - Analyte present, reported value may be biased high.  
L - Analyte present, reported value may be biased low.

UL - Not detected, quantitation limit is probably higher

SE - Not detected, quantitation limit is probably higher

D. Sample diluted in the lab for analysis

D - Sample diluted in the  
NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

F - Discrepancy in GC analysis. Lowe  
B - Analyte Detected in Method Blank

R - Data Rejected

Table 2 (continued)

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	P-4																				
	2/02	4/02	7/02	10/02	1/03	4/03	7/03	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	1/08		
<b>Inorganics (<math>\mu\text{g/l}</math>)</b>																					
Nitrate Nitrogen (mg/l)	--	--	--	--	--	3.15	0.22	--	--	13.5 U	11.9 U	13 U	14.7	12.4 U	34.4 U	20.5 U	35.4 U	37.6 U	11.1 U	--	
Aluminum	--	--	--	--	--	--	--	4.4 U	2.1 U	3.8 U	3.7 U	1.6 U	2.2 U	1.8	1.8 U	2.2	1.7 U	2.1 U	--	--	
Antimony	--	--	--	--	--	--	--	2 U	1.8 U	2.1 U	3 U	3.7 U	2 U	1.4 U	1.6 U	2.8 U	2.6 U	2.2 U	2.8 U	--	
Arsenic	--	--	--	--	--	--	--	1.8 U	2.1 U	3 U	3.7 U	2 U	1.4 U	1.6 U	2.8 U	2.6 U	2.2 U	2.8 U	--	--	
Barium	--	--	--	--	--	--	--	29.8	520	497	886	773	569	88.6	79.7	79.3	82.4	84.2	19.5	--	
Beryllium	--	--	--	--	--	--	--	5 U	0.1 U	0.77 U	0.61 U	0.17	0.19 U	0.60 U	0.46 U	0.33 U	0.45 U	0.20 U	--	--	
Cadmium	--	--	--	--	--	--	--	--	--	0.6 U	0.5 U	0.2 U	0.20 U	0.32 U	0.40 U	0.20 U	0.20 U	0.40 U	0.40 U	--	--
Calcium	--	--	--	--	--	--	--	5320	20300	17500	25100	22500	21100	16200	17700	18000	17100	9580	--	--	
Calcium, Total	--	--	--	--	--	--	--	--	--	--	--	--	--	13900	17200	16000	--	--	--	--	
Cobalt	--	--	--	--	--	--	--	8.1	84.5	77.5	162	198	137	13.8	11.7	12.5	11.6	1.5 U	--	--	
Copper	--	--	--	--	--	--	--	2.1 B	2.3 B	44.5	0.8 U	0.83	0.30 U	2.0 U	1.7	1.4	0.88	3.3 U	--	--	
Lead	--	--	--	--	--	--	--	0.9 U	1.3 U	1.2 U	1.6 U	1.1 U	1.0 U	1.0 U	1.9 U	1.6 U	1.2 U	1.4 U	--	--	
Magnesium	--	--	--	--	--	--	--	1660	10400	9130	14500 J	13300	12000	2430	2310	2370	2230	1700	--	--	
Magnesium, Total	--	--	--	--	--	--	--	--	--	--	--	--	--	1990	2110	2050	--	--	--	--	
Mercury	--	--	--	--	--	--	--	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	--	
Nickel	--	--	--	--	--	--	--	9.1	30.7 B	10.5 U	14.3	14.4	9.9	3.8	3.4	3.9	3.3	4.3	--	--	
Potassium	--	--	--	--	--	--	--	1250	6880	8690 J	11600 J	9870	7260	11000	9850	10100	9470	9420 J	--	--	
Selenium	--	--	--	--	--	--	--	2.6 U	2.7 U	1.7 U	4.5 U	4.3 U	4.9	1.8 U	2.2 U	2.5 U	2.1 U	2.7 U	--	--	
Silver	--	--	--	--	--	--	--	0.7 U	0.8 U	1.4 U	1.3 U	0.2 U	0.50 U	0.50 U	0.30 U	0.50 U	0.40 U	1.2 U	--	--	
Sodium	--	--	--	--	--	--	--	6590	37000	34700	57000	51300	45500	7840	8160	7510	7250	3240	--	--	
Thallium	--	--	--	--	--	--	--	1.9 U	3 U	2.9 U	4 U	4.5 U	3.9 U	2.1 U	3.6 U	3.4 U	3.4 U	2.9 U	--	--	
Vanadium	--	--	--	--	--	--	--	0.4 U	0.5 U	1 U	1.2	0.5 U	0.31	0.40 U	0.30 U	0.40 U	0.40 U	0.50 U	--	--	
Zinc	--	--	--	--	--	--	--	16.5	28.3	91	27.4 U	20.8	10.5	1010	998	937	772	386	--	--	
Alkalinity, Total (mg/L as CaCO <sub>3</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	55.0	63.0	24.0	--	--	--	--	--	
<b>Dissolved Gases</b>																					
Oxygen (mg/l)	--	--	--	--	--	4.51	1.00 U	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methane (mg/l)	--	--	--	--	--	0.6 JB	4	--	--	--	--	--	--	--	--	--	--	--	--	--	
Ethane ( $\mu\text{g/l}$ )	--	--	--	--	--	0.05 JB	0.05 B	--	--	--	--	--	--	--	--	--	--	--	--	--	
Ethene ( $\mu\text{g/l}$ )	--	--	--	--	--	2 U	0.04 B	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon Dioxide (mg/l)	--	--	--	--	--	86	90 L	--	--	--	--	--	--	--	--	--	--	--	--	--	
<b>Pesticides/Herbicides (<math>\mu\text{g/l}</math>)</b>																					
4,4'-DDD	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
4,4'-DDE	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
4,4'-DDT	--	--	--	--	--	--	--	0.02 U	0.0015 J	0.02 U	0.02 U	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--	
Aldrin	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.015 KN	--	0.01 U	--	--	--					
alpha-BHC	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.01 U	--	0.0043 JN	--	--	--					
Alpha-Chlorodane	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.01 U	--	0.0075 JN	--	--	--					
beta-BHC	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.0078 KN	--	0.0078 KN	--	--	--					
delta-BHC	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.008 KN	--	0.02 U	--	--	--					
Die�din	--	--	--	--	--	--	--	0.0092 J	0.0084 J	0.0028 J	0.0051 J	0.0028 J	0.2 U	--	0.02 U	--	0.02 U	--	--	--	
Endosulfan I	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.01 U	--	0.01 U	--	--	--					
Endosulfan II	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
Endosulfan sulfate	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
Endrin	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
Endrin Aldehyde	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
Endrin Ketone	--	--	--	--	--	--	--	0.02 U	0.2 U	--	0.02 U	--	0.02 U	--	--	--					
gamma-BHC (Lindane)	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.01 U	--	0.02 U	--	--	--					
gamma-Chlorodane	--	--	--	--	--	--	--	0.01 U	0.0018 J	0.01 U	0.01 U	0.01 U	0.022 J	0.1 U	--	0.01 U	--	0.01 U	--	--	--
Heptachlor	--	--	--	--	--	--	--	0.01 U	0.1 U	--	0.01 U	--	0.01 U	--	--	--					
Heptachlor Epoxide	--	--	--	--	--	--	--	0.01 U	0.0034 J	0.01 U	0.01 U	0.01 U	0.011 J	0.0076 J	--	0.01 U	--	0.01 U	--	--	--
Methoxychlor	--	--	--	--	--	--	--	0.1 U	0.1 U	0.1 U	--	0.1 U	--	0.1 U	--	--	--				
Toxaphene	--	--	--	--	--	--	--	--	--	--	--	1 U	1 U	1 U	--	1.0 U	--	1.0 U	--	--	--

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Table 2 (continued)

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	P-6																													
	2/02	4/02	7/02	10/02	1/03	4/03	7/03	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	7/07	10/07	1/08	4/08	7/08	10/08	1/09	4/09	10/09	4/10		
<b>Non-Halogenated VOCs (µg/l)</b>																														
Benzene	76 J	55 J	--	--	--	32	12 B	24	91	150	170	290	340 D	380	450	600	520	700	570	710	420	730	590	330	560	170	140	16		
Toluene	0.9 J	0.6 J	--	--	--	5 U	1.2 B	0.5 U	3 J	11	17	20	20	22	47	240	270	410	390	260	220	480	570	24	330	5.7 U	10 U	1 U		
Ethylbenzene	19	11	--	--	--	5 U	5.9 B	0.34 J	55	74	140	270	300 D	340	390	520	570	590	430	510	320	720	520	290	500	110	31	0.61 J		
Xylene (total)	6	4	--	--	--	5 U	10 B	0.35 J	110	160	250	530	510	690	770	980	1100	1200	860	1000	650	1400	1100	590	930	24 J	3 U			
2-Butanone	--	--	--	--	--	--	--	--	5 U	10 U	10 R	10 U	10 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	50 U	5 U		
Acetone	--	--	--	--	--	--	--	--	5 UJR	20 U	20 R	20 R	8.5 J	100 U	50 U	5 U														
Carbon Disulfide	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	10 U	20 U	15 UJ	40 U	20 U	10 U	1 U											
Cyclohexane	--	--	--	--	--	--	--	--	0.36 J	--	--	--	3.5 J	20 U	9.5 J	8.8 J	9.1 J	8.6 J	13 J	9.1 J	6.8 J	19 J	3.6 J	10 U	0.38 J					
Isopropylbenzene	--	--	--	--	--	--	--	--	1.3	--	--	--	7.5 J	7.0 J	9.5 J	11 J	13 J	9.6 J	8.9 J	40 U	8.5 J	15 J	50 U	92 J	12 J	2.6 J	2.6 J	0.35 J		
Methyl-tert-butyl ether	--	--	--	--	--	--	--	--	0.5	--	--	--	10 U	20 U	20 U	20 U	20 U	15 U	40 U	20 U	10 U	1 U								
Methylcyclohexane	--	--	--	--	--	--	--	--	0.5 U	--	--	--	2.5 J	4.5 J	5.5 J	6.9 J	9.2 J	8.8 J	6.7 J	40 U	7.2 J	9.4 J	7.4 J	13 J	10 U	10 U	0.33 J			
4-Methyl-2-pentanone	--	--	--	--	--	--	--	--	5 U	10 UJ	10 U	10 U	2.0 J	100 U	75 U	200 U	100 U	250 U	100 U	100 U	50 U	50 U	5 U							
<b>Halogenated VOCs (µg/l)</b>																														
Bromoform	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Bromodichloromethane	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Carbon Tetrachloride	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Chlorobenzene	1	1	--	--	--	5 U	0.5 U	0.74	1 J	2 J	2 J	4 J	3.7 J	4.8 J	6.6 J	6.3 J	6.4 J	7.4 J	5.7 J	40 U	20 U	8.5 J	50 U	4.5 J	6.1 J	10 U	2.3 J	0.20 J		
Chloroform	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Dibromochloromethane	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
1,2-Dichloroethane	1 U	1 U	--	--	--	5 U	0.5 U	0.22 J	5 U	5 U	5 U	5 U	7.3 J	20 U	15 U	40 U	20 U	10 UJ	1 U											
1,3 Chlorobenzene	--	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,1-Dichloroethane	1	1	--	--	--	0.8 J	0.5 U	0.77	5 U	5 U	1 J	2 J	2.1 J	20 U	15 U	40 U	20 U	10 UJ	1 U											
cis-1,2-Dichloroethene	2	2	--	--	--	0.7 J	0.15 J	0.59	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
trans-1,2-Dichloroethene	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
1,1-Dichloroethene (total)	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
1,2-Dichloroethene (total)	2 J	2 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,2-Dichlorobenzene	0.4 JB	0.4 J	--	--	--	5 U	0.073 J	0.29 J	--	--	--	--	1.3 J	20 U	22 J	2.1 J	40 U	1.7 J	3.2 J	50 U	20 U	20 U	10 UJ	1 U						
1,3-Dichlorobenzene	1 U	1 U	--	--	--	5 U	0.051 J	0.5 U	--	--	--	--	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
1,4-Dichlorobenzene	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	--	--	--	--	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Chloroethane	1 U	0.2 J	--	--	--	5 U	0.32 J	5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Chloromethane	1 U	1 U	--	--	--	--	--	--	--	--	--	--	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Tetrachloroethene	1 U	1 U	--	--	--	5 U	0.007 J	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
1,1,1-Trichloroethane	1 U	1 U	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Trichloroethene	0.2 J	1 U	--	--	--	5 U	0.043 J	0.5 U	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Vinyl Chloride	1	0.9 J	--	--	--	5 U	0.5 U	0.14 J	5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
cis-1,2-Dichloropropane	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
cis-3-Dichloropropene	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Methylene Chloride	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	10 U	20 U	15 U	40 U	20 U	10 UJ	1 U											
Trichlorofluoromethane	--	--	--	--	--	--	--	--	0.16 J	--	--	--	10 UJ	20 U	15 U	40 U	20 U	10 UJ	1 U											
<b>Semi-Volatiles (µg/l)</b>																														
Bis(2-chloroethyl)Ether	5 U	45	97	59	45	22	82 D	18	47	56	41	130 D	140 D	150 D	220 D	260 D	320	320 D	340 D	170	210	210 D	52 J	66	13					
Bis(2-ethylhexyl)Phthalate	5 U	--	--	--	--	--	--	--	5 U	5 U	19	5.7	6.2 U	30 L	19 L	7.3 J	36 U	5 U	14 U	50 U	50 U	5.1 U	5.3 U	5.0 U	5.0 U	5.0 U	5.0 U			
2,2'-oxypy (1-Chloropropane)	--	--	--	--	--	--	--	--	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	36 U	5 U	14 U	50 U	50 U	5.1 U	5.3 U	5.0 U	5.0 U	5.0 U	5.0 U			
2,4-Dimethylphenol	--	--	--	--	--	--	--	--	5 U	5 U	1 J	5 U	6.2	5 U	4.5 J	6.3	6.6	12	13 J	14	15	17	7.6	10	9.2	13 UJ	6.5 J	5.0 U		
2-Methylnaphthalene	--	--	--	--	--	--	--	--	5 U	5 U	17	13	31	5 U	11	27	73	110 D	92	64	32	33	5.0 U	28	5.1 U	5.0 U	5.3 U	5.0 U		
2-Methylphenol	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	36 U	5 U	14 U	50 U	50 U	5.1 U	5.0 U	5.3 U	5.0 U	5.0 U	5.0 U			
4-Methylphenol	--																													

**Table 2 (continued)**

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	P-6																
	2/02	4/02	7/02	10/02	1/03	4/03	7/03	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/08
<b>Inorganics (<math>\mu\text{g/l}</math>)</b>																	
Nitrate Nitrogen (mg/l)	--	--	--	--	--	0.080	0.2	--	--	--	--	--	--	--	--	--	0.05 U
Aluminum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium, Total	--	--	--	--	--	--	--	--	--	--	--	--	25300	24800	29900	--	--
Cobalt	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium, Total	--	--	--	--	--	--	--	--	--	--	--	--	12800	12700	15200	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	73	72	156	--	--
Alkalinity, Total (mg/l as CaCO <sub>3</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Dissolved Gases</b>																	
Oxygen (mg/l)	--	--	--	--	--	0.8	--	--	--	--	--	--	--	--	--	--	--
Methane (mg/l)	--	--	--	--	--	230 JB	0.4 B	--	--	--	--	--	--	--	--	--	--
Ethane ( $\mu\text{g/l}$ )	--	--	--	--	--	8 B	2 U	--	--	--	--	--	--	--	--	--	--
Ethene ( $\mu\text{g/l}$ )	--	--	--	--	--	0.04 JB	0.05 J	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide (mg/l)	--	--	--	--	--	26	59 L	--	--	--	--	--	--	--	--	--	--
<b>Pesticides/Herbicides (<math>\mu\text{g/l}</math>)</b>																	
4,4'-DDD	--	--	--	--	--	--	--	0.02 U	0.018U	0.02 U	0.02 U	0.0033 JN	0.0081 J	--	--	--	--
4,4'-DDE	--	--	--	--	--	--	--	0.02 U	0.0021J	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--
4,4'-DDT	--	--	--	--	--	--	--	0.02 U	0.018U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--
Aldrin	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
alpha-BHC	--	--	--	--	--	--	--	0.01 U	0.0037J	0.0086 J	0.01	0.028	0.010 U	--	--	--	--
Alpha-Chlorodane	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.0007 J	0.010 U	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
delta-BHC	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
Dieldrin	--	--	--	--	--	--	--	0.02 U	0.018 U	0.02 U	0.02 U	0.02 U	0.0078 J	--	--	--	--
Endosulfan I	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
Endosulfan II	--	--	--	--	--	--	--	0.02 U	0.018 U	0.02 U	0.02 U	0.0035 J	0.082	--	--	--	--
Endosulfan sulfate	--	--	--	--	--	--	--	0.02 U	0.018 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--
Endrin	--	--	--	--	--	--	--	0.02 U	0.018 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--
Endrin Aldehyde	--	--	--	--	--	--	--	0.02 U	0.018 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--
Endrin Ketone	--	--	--	--	--	--	--	0.02 U	0.018 U	0.02 U	0.02 U	0.02 U	0.020 U	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.0053 J	0.010 U	--	--	--	--
gamma-Chlorodane	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
Heptachlor	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
Heptachlor Epoxide	--	--	--	--	--	--	--	0.01 U	0.0091U	0.01 U	0.01 U	0.01 U	0.010 U	--	--	--	--
Methoxychlor	--	--	--	--	--	--	--	0.1 U	0.091U	0.1 U	0.1 J	0.012 J	0.10 U	--	--	--	--
Toxaphene	--	--	--	--	--	--	--	--	--	--	1 U	1 U	1.0 U	--	--	--	--

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

Table 2 (continued)

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	MW-26N																																	
	10/00	1/01	4/01	7/01	10/01	1/02	4/02	7/02	10/02	1/03	4/03	7/03	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	7/07	10/07	1/08	4/08	7/08	10/08	1/09	4/09	10/09	4/10	
<b>Non-Halogenated VOCs (µg/l)</b>																																		
Benzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	0.18 J	0.64 J	0.38 J	0.38 J	5.8	0.97 J	0.46 J	0.85 J	1.5	0.53 J	0.39 J	0.92 J	1 U	0.48 J	0.49 J		
Toluene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1.4 J	0.76 J	0.47 J	1 U	1 U	0.22 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Ethylbenzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (total)	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.2 JB	0.5 U	5 U	5 U	5 U	10 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	
2-Butanone	--	--	--	--	--	--	--	--	--	--	5 U	10 R	10 U	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Acetone	--	--	--	--	--	--	--	--	--	--	5 U	20 R	20 U	20 R	20 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Carbon Disulfide	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U		
Cyclohexane	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Isopropylbenzene	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methyl-tert-butyl ether	--	--	--	--	--	--	--	--	--	--	0.34 J	--	--	0.34 J	1 U	1 U	0.30 J	1 U	1 U	0.14 J	1 U	0.23 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methylcyclohexane	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
4-Methyl-2-pentanone	--	--	--	--	--	--	--	--	--	--	5 U	10 U	10 U	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
<b>Halogenated VOCs (µg/l)</b>																																		
Bromine	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
Bromodichloromethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
Carbon Tetrachloride	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
Chlorobenzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
Chloroform	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.03 J	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dichloroethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.15 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
1,3 Chlorobenzene	--	--	--	--	--	--	--	--	--	--	5 U	0.055 J	0.15 J	5 U	5 U	5 U	10 U	1 U	0.48 J	1 U	0.16 J	1 U	2.5	2	1.5	1.0	1 U	0.54 J	0.96 J	1 U	0.23 J	0.86 J		
1,1-Dichloroethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
cis-1,2-Dichloroethene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
trans-1,2-Dichloroethene	--	--	--	--	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-Dichloroethene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethene (total)	--	--	2 U	2 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichlorobenzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,3-Dichlorobenzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-Dichloroethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,3-Dichlorobenzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,4-Dichlorobenzene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Chloroethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Chloromethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Tetrachloroethene	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1,1-Trichloroethane	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	0.11 J	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichloroethylene	--	--	1	1	--	--	--	--	--	--	5 U	0.5 U	0.67	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Vinyl Chloride	--	--	1 U	1 U	--	--	--	--	--	--	5 U	0.5 U	--	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2,4-Trichlorobenzene	--	--	--	--	--	--	--	--	--	--	5 U	0.5 U	--	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	5 U	0.5 U	--	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methylene Chloride	--	--	--	--	--	--	--	--	--	--	5 U	0.5 U	--	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichlorofluoromethane	--	--	--	--	--	--	--	--	--	--	5 U	0.5 U	--	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Inorganics (mg/l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
Dissolved Manganese	--	--	0.017 B	0.011 U	--	--	--	--	--	--	0.0192 U																							

**Table 2 (continued)**

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	MW-26N																					
	10/00	1/01	4/01	7/01	10/01	1/02	4/02	7/02	10/02	1/03	4/03	7/03	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/08
<b>Inorganics (µg/l)</b>																						
Nitrate Nitrogen (mg/l)	--	--	--	--	--	--	--	--	--	--	1.42	1.56	--	--	--	--	--	--	--	--	0.415	
Aluminum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium, Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7790	7050	8880	--	
Cobalt	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Magnesium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Magnesium, Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3340	3770	4400	--	
Mercury	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Nickel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Selenium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sodium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, Total (mg/l as CaCO <sub>3</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	23.0	16.0	30.0	--	
<b>Dissolved Gases</b>																						
Oxygen (mg/l)	--	--	--	--	--	--	--	--	--	--	1.3	--	--	--	--	--	--	--	--	--	--	
Methane (mg/l)	--	--	--	--	--	--	--	--	--	--	0.3 JB	0.3 B	--	--	--	--	--	--	--	--	--	
Ethane (µg/l)	--	--	--	--	--	--	--	--	--	--	2 U	2 U	--	--	--	--	--	--	--	--	--	
Ethene (µg/l)	--	--	--	--	--	--	--	--	--	--	0.04 JB	0.04 B	--	--	--	--	--	--	--	--	--	
Carbon Dioxide (mg/l)	--	--	--	--	--	--	--	--	--	--	71	82 L	--	--	--	--	--	--	--	--	--	
<b>Pesticides/Herbicides (µg/l)</b>																						
4,4'-DDD	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.020 U	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.020 U	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.0055 J	0.02 U	0.020 U	--	--	--	--	--
Aldrin	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.01 U	0.01 U	0.010 U	--	--	--	--	--
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.01 U	0.01 U	0.010 U	--	--	--	--	--
Alpha-Chlorodane	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.01 U	0.01 U	0.010 U	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.01 U	0.01 U	0.010 U	--	--	--	--	--
delta-BHC	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.01 U	0.01 U	0.010 U	--	--	--	--	--
Dieldrin	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.02 U	--	--	--	--	--
Endosulfan I	--	--	--	--	--	--	--	--	--	--	--	0.0063 J	0.01 U	0.0093 U	0.01 U	0.01 U	0.0015 J	--	--	--	--	--
Endosulfan II	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.020 U	--	--	--	--	--
Endosulfan sulfate	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.0062 J	0.019 U	0.02 U	0.02 U	0.020 U	--	--	--	--	--
Endrin	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.0015 J	0.02 U	0.020 U	--	--	--	--	--
Endrin Aldehyde	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.019 U	0.02 U	0.028 J	0.020 U	--	--	--	--	--
Endrin Ketone	--	--	--	--	--	--	--	--	--	--	--	0.02 U	0.02 U	0.012 J	0.02 U	0.02 U	0.020 U	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.01 U	0.01 U	0.010 U	--	--	--	--	--
gamma-Chlorodane	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.0065 J	0.0018 J	0.01 U	0.0016 J	0.010 U	--	--	--	--	--
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	0.01 U	0.01 U	0.0093 U	0.011 JN	0.01 U	0.010 U	--	--	--	--	--
Heptachlor Epoxide	--	--	--	--	--	--	--	--	--	--	--	0.1 U	0.1 U	0.093 U	0.1 U	0.1 U	0.10 U	--	--	--	--	--
Methoxychlor	--	--	--	--	--	--	--	--	--	--	--	--	0.1 U	0.1 U	0.093 U	1 U	1 U	1.0 U	--	--	--	--
Toxaphene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

-- Not analyzed or data not available to RAI as of May 6, 2010

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

**Table 2 (continued)**  
 Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand & Gravel Landfills

Parameter	PW-1(U)																								
	10/04	10/04	12/04	1/05	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	7/07	10/07	1/08	4/08	7/8	10/08	1/09	4/09	10/09	4/10	
<b>Non-Halogenated VOCs (µg/l)</b>																									
Benzene	170 D	170 D	270	180	270	260	160	160	200	160	240	200	130	160 D	160	220	140	160	140	81	120	130	100	100	
Toluene	18 B	14 B	69	28	21	160	170	190	360 D	330	510	450	290	340 D	310	420	400	490	220	210	260	300 J	240	250	
Ethylbenzene	130 D	160 D	130	57	120	170	63	80	130	77	110	99	54	57 D	50	63	59	75	39	41	47	66	44	60	
Xylene (total)	350 D	420 D	490	270	410	410	290	270	310	230	260	280	170	180 D	170	230	180	230	140	130	140	190 J	150	170	
2-Butanone	1.7 J	1 J	130 U	130 U	10 U	10 U	10 U	10 U	5.9 J	50 U	100 U	100 U	100 U	4.8 J	75 U	100 UU	100 U	100 U	50 U	100 U	100 U	100 U	62 U		
Acetone	5.5 B	2.7 JB	130 U	100 J	20 R	7 J	20 R	8 J	8.2 J	50 UU	100 U	100 U	100 U	8.2	75 U	100 UU	100 U	100 U							
Carbon Disulfide	0.5 U	0.12 JB	13 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	5.7 R	20 U	10 U	10 U	12 U	
Cyclohexane	6.2	15	13 U	13 U	--	--	--	--	5.4 J	10 U	20 U	20 U	20 U	4.1	3.5 J	3 J	3.5 J	4.2 J	2.5 J	20 U	20 UJ	10 U	10 U	4.0 J	
Isopropylbenzene	8.8	12	7.6 J	4.0 J	--	--	--	--	10	5.3 J	7.1 J	7.6 J	5.3 J	7.0	4.7 J	6.5 J	20 U	5.6 J	4.6 J	20 U	6.0 J	5.8 J	4.5 J	5.3 J	
Methyl-tert-butyl ether	0.64	0.41 J	13 U	13 U	--	--	--	--	10 U	10 U	20 U	20 U	20 U	0.23 J	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Methylcyclohexane	7.7	16	13 U	13 U	--	--	--	--	9.8 J	6.3 J	4.7 J	8.3 J	5.0 J	5.9	4.7 J	6.1 J	4.9 J	6.6 J	4.0 J	20 U	20 U	20 U	4.2 J	5.5 J	5.2 J
Styrene	0.5 U	0.50 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
4-Methyl-2-pentanone	1.6 J	5 U	130 U	10 U	10 U	10 UU	10 U	3.4 J	50 U	100 U	100 U	100 U	3.2 J	75 U	100 U	100 U	50 U	100 U	100 U	50 U	100 U	50 U	62 U		
<b>Halogenated VOCs (µg/l)</b>																									
Bromform	0.5 U	0.5 U	4.1 J	8.4 J	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 UJ	10 U	12 U		
Bromodichloromethane	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Carbon Tetrachloride	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Chlorobenzene	6.3	5.8	8.6 J	6.4 J	9	7	3 J	4 J	4.7 J	3.6 J	5.6 J	5.2 J	20 U	4.3	15 U	20 U	20 U	3.8 J	20 U	20 U	3.6 J	4.0 J	3.7 J		
Chloroform	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Dibromochloromethane	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,2-Dichloroethane	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,3 Chlorobenzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,1-Dichloroethane	1	1	13 U	13 U	1 J	1 J	5 U	5 U	10 U	10 U	20 U	20 U	20 U	0.56 J	20 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
cis-1,2-Dichloroethene	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	0.31 J	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
trans-1,2-dichloroethene	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,1-Dichloroethene	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,2-Dichloroethene (total)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,2-Dichlorobenzene	4.7	3.9	4.3 J	3.8 J	--	--	--	--	1.5 J	10 U	20 U	20 U	20 U	0.92 J	15 U	20 U	20 U	10 U	20 U	20 U	10 J	10 U	12 U		
1,3-Dichlorobenzene	0.5 U	0.5 U	13 U	13 U	--	--	--	--	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,4-Dichlorobenzene	0.27 J	0.24 J	13 U	13 U	--	--	--	--	10 U	10 U	20 U	20 U	20 U	0.14 J	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Chloroethane	0.19 J	0.27 J	13 U	13 U	5 U	5 U	5 U	5 U	10 UU	10 R	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Tetrachloroethene	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,1,1-Trichloroethane	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,1,2-Trichloroethane	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	13 U	13 U	--	--	--	--	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Trichloroethene	0.41 J	0.34 J	13 U	13 U	1 J	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	0.33 J	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Vinyl Chloride	0.5 U	0.5 U	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
1,2,4-Trichlorobenzene	0.31	0.33	13 U	13 U	--	--	--	--	10 U	10 U	20 U	20 U	20 U	0.14 J	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
cis-1,3-Dichloropropene	0.1 J	0.5 U	13 U	13 U	--	--	--	--	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Methylene Chloride	0.12	0.12 J	13 U	13 U	5 U	5 U	5 U	5 U	10 U	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Trichlorofluoromethane	0.5 U	0.5 U	13 U	13 U	--	--	--	--	10 UU	10 U	20 U	20 U	20 U	1 U	15 U	20 U	20 U	10 U	20 U	20 U	10 U	10 U	12 U		
Semi-Volatiles (ug/l)	<b>(ug/l)</b>																								
Bis(2-chloroethyl)Ether	160 D	99	6.7	110 E	110 D	61	53	46	55	46	57	39	40	42	47	40	31	37	43	31	34	27	31	19	
Bis(2-ethylhexyl)phthalate	5 U	5.1 U	5.0 U	5.0 U	5 U	5 U	5.3 U	5 U	5 U	5 U	30 K	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5.0 UU	2.3 J		
2,2'-oxybis(1-Chloropropane)	5 U	5.1 U	5.0 U	5.0 U	5 U	5 U	5.3 U	5 U	5 U	5 U	30 K	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5.0 U	5.0 U		
2,4-Dimethylphenol	8.8	6.5	6.1	17	22	5.5	30	15	4.4 J	6.5	3.9 J	3.7 J	3.1 J	2.1 J	2.8 J	11	5 U	1.7 J	1.9 J	1.5 J	1.4 J	1.9 J	2.0 J	5.0 U	
2-Methylnaphthalene	5 U	5.1 U	5.0 U	5.0 U	5 U	5 U	5.3 U	5 U	5 U	5 U	604	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5.0 U	5.0 U		
2-Methylphenol	8.9	4.7 J	2.5 J	3.0 J	5 U	3 J	2.5 J	8	4.7 J	11	6.5	5.2	3.6 J	2.6 J	4.3 J	13	3.2 J	5 U	3.2 J	4.1 J	2.6 J	5.4	3.6 J	4.1 J	5.0 U
Acetophenone	1.7 J	5.1 U	5.0 U	2.7 J	2.3 J	5 U	5.3 U	5 U	1.8 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Caprolactam	23	13	15	13	10	7.3	4.3 L	3.5 J	5.1	3.1 L	4.0 J	2.3 J	2.9 J	3.1 J	5 UJ	2.4 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Diethylphthalate	1.6 J	5 U	5.0 U	3.0 J	2.8 J	1.6 J	1.7 J	1.5 J	1.4 J	2.1 J	1.9 J	2.1 J	1.9 J	2.1 J	1.7 J	1.6 J	1.3 J	1.8 J	5 U	5 U	5.3 U	5			

**Table 2 (continued)**

Historical Summary of Groundwater Quality Data Collected by New Castle County for the Vicinity of the Army Creek and Delaware Sand &amp; Gravel Landfills

Parameter	MW-38N 4/10
<b>Non-Halogenated VOCs (µg/l)</b>	
Benzene	--
Toluene	--
Ethylbenzene	--
Xylene (total)	--
2-Butanone	--
Acetone	--
Carbon Disulfide	--
Cyclohexane	--
Isopropylbenzene	--
Methy-tert-butyl ether	--
Methylcyclohexane	--
Styrene	--
4-Methyl-2-pentanone	--
<b>Halogenated VOCs (µg/l)</b>	
Bromoform	--
Bromodichloromethane	--
Carbon Tetrachloride	--
Chlorobenzene	--
Chloroform	--
Dibromochloromethane	--
1,2-Dichloroethane	--
1,3 Chlorobenzene	--
1,1-Dichloroethane	--
cis-1,2-Dichloroethene	--
trans-1,2-dischloroethene	--
1,1-Dichloroethene	--
1,2-Dichloroethene (total)	--
1,2-Dichlorobenzene	--
1,3-Dichlorobenzene	--
1,4-Dichlorobenzene	--
Chloroethane	--
Tetrachloroethene	--
1,1,1-Trichloroethane	--
1,1,2-Trichloroethane	--
1,1,2,2-Tetrachloroethane	--
Trichloroethene	--
Vinyl Chloride	--
1,2,4-Trichlorobenzene	--
cis-1,3-Dichloropropene	--
Methylene Chloride	--
Trichlorofluoromethane	--
<b>Semi-Volatiles (µg/l)</b>	
Bis(2-chloroethyl)Ether	--
Bis(2-ethylhexyl)phthalate	--
2,2'-oxybis (1-Chloropropane)	--
2,4-Dimethylphenol	--
2-Methylnaphthalene	--
2-Methylphenol	--
4-Methylphenol	--
Acetophenone	--
Caprolactam	--
Diethylphthalate	--
Dimethylphthalate	--
N-Nitrosodiphenylamine	--
Naphthalene	--
1,1'- Biphenyl	--
Di (n-butyl) phthalate	--
2,4-Dichlorophenol	--
bis (2-chloroethoxy)methane	--
Di-n-octylphthalate	--
Phenol	--
<b>Inorganics (mg/l)</b>	
Dissolved Manganese	--
Dissolved Iron	--
Dissolved Lead	0.010 U
<b>Biological Oxygen Demand (mg/l)</b>	
<b>Field Parameters</b>	
Temperature (Degrees Celcius)	13.7
Conductivity (µs/cm)	366
pH (standard units)	5.63
Dissolved Oxygen (mg/l)	0.00
ORP (mV)	115
Water-Level Elevation (ft, MSL)	-5.50

-- Not analyzed

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

B - Analyte Detected in Method Blank

**Table 3**  
 Quality Assurance and Quality Control Sample Results for April 2010  
 for Groundwater and Blanks  
 Vicinity of the Army Creek and Delaware Sand & Gravel Landfills

Parameter				
	PW-1U	MW-96 DUP of PW-1U	Field Blank	Trip Blank
<b>Non-Halogenated VOCs (µg/l)</b>				
Benzene	100	100	1.0 U	1.0 U
Toluene	250	260	1.0 U	1.0 U
Ethylbenzene	60	63	1.0 U	1.0 U
Xylene (total)	170	180	3.0 U	3.0 U
2-Butanone	62 U	62 U	5.0 U	5.0 U
Acetone	62 U	62 U	6.7	3.4 J
Carbon Disulfide	12 U	12 U	1.0 U	0.66 J
Cyclohexane	4.0 J	3.4 J	1.0 U	1.0 U
Isopropylbenzene	5.3 J	5.5 J	1.0 U	1.0 U
Methyl-tert-butyl ether	12 U	12 U	1.0 U	1.0 U
Methylcyclohexane	5.2 J	5.5 J	1.0 U	1.0 U
Styrene	12 U	12 U	1.0 U	1.0 U
4-Methyl-2-pentanone	62 U	62 U	5.0 U	5.0 U
<b>Halogenated VOCs (µg/l)</b>				
Bromoform	12 U	12 U	1.0 U	1.0 U
Bromodichloromethane	12 U	12 U	1.0 U	1.0 U
Carbon Tetrachloride	12 U	12 U	1.0 U	1.0 U
Chlorobenzene	3.7 J	4.2 J	1.0 U	1.0 U
Chloroform	12 U	12 U	1.0 U	1.0 U
Dibromochloromethane	12 U	12 U	1.0 U	1.0 U
1,2-Dichloroethane	12 U	12 U	1.0 U	1.0 U
1,1-Dichloroethane	12 U	12 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	12 U	12 U	1.0 U	1.0 U
trans-1,2-dichloroethene	12 U	12 U	1.0 U	1.0 U
1,1-Dichloroethene	12 U	12 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	12 U	12 U	1.0 U	1.0 U
1,2-Dichlorobenzene	12 U	12 U	1.0 U	1.0 U
1,3-Dichlorobenzene	12 U	12 U	1.0 U	1.0 U
1,4-Dichlorobenzene	12 U	12 U	1.0 U	1.0 U
Chloroethane	12 U	12 U	1.0 U	1.0 U
Chloromethane	12 U	12 U	0.31 J	1.0 U
Tetrachloroethene	12 U	12 U	1.0 U	1.0 U
1,1,1-Trichloroethane	12 U	12 U	1.0 U	1.0 U
1,1,2-Trichloroethane	12 U	12 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	12 U	12 U	1.0 U	1.0 U
Trichloroethene	12 U	12 U	1.0 U	1.0 U
Vinyl Chloride	12 U	12 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	12 U	12 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	12 U	12 U	1.0 U	1.0 U
Methylene Chloride	12 U	7.2 U	1.0 U	1.0 U
Trichlorofluoromethane	12 U	12 U	1.0 U	1.0 U
<b>Semi-Volatiles (µg/l)</b>				
Bis(2-chloroethyl)Ether	19	22	5 U	--
Bis(2-ethylhexyl)phthalate	2.3 J	5 U	5 U	--
2,2'-oxybis (1-Chloropropane)	5 U	5 U	5 U	--
2,4-Dimethylphenol	5 U	5 U	5 U	--
2-Methylnaphthalene	5 U	5 U	5 U	--
2-Methylphenol	5 U	5 U	5 U	--
4-Methylphenol	5 U	5 U	5 U	--
Acetophenone	5 U	5 U	5 U	--
Caprolactam	5 U	5 U	5 U	--
Diethylphthalate	5 U	5 U	5 U	--
Dimethylphthalate	5 U	5 U	5 U	--
N-Nitrosodiphenylamine	5 U	5 U	5 U	--
Naphthalene	5 U	5 U	5 U	--
1,1'-Biphenyl	5 U	5 U	5 U	--
Di (n-butyl) phthalate	5 U	5 U	5 U	--
2,4-Dichlorophenol	5 U	5 U	5 U	--
bis (2-chloroethoxy)methane	5 U	5 U	5 U	--
Di-n-octylphthalate	5 U	5 U	5 U	--
Phenol	5 U	5 U	5 U	--
<b>Inorganics (mg/l)</b>				
Dissolved Manganese	3.59	3.51	0.015 U	--
Dissolved Iron	33.3	32.3	0.100 U	--

-- Not analyzed

U - Analyte was not detected above the reporting limit

J - Estimated concentration.

K - Analyte present, reported value may be biased high.

L - Analyte present, reported value may be biased low.

UL - Not detected, quantitation limit is probably higher

D - Sample diluted in the lab for analysis.

NP - Well not pumping

P - Discrepancy in GC analysis. Lower value reported

B - Analyte Detected in Method Blank

R - Data Rejected

# **FIGURES**

CHECKED: MR

DRAFTER: CP

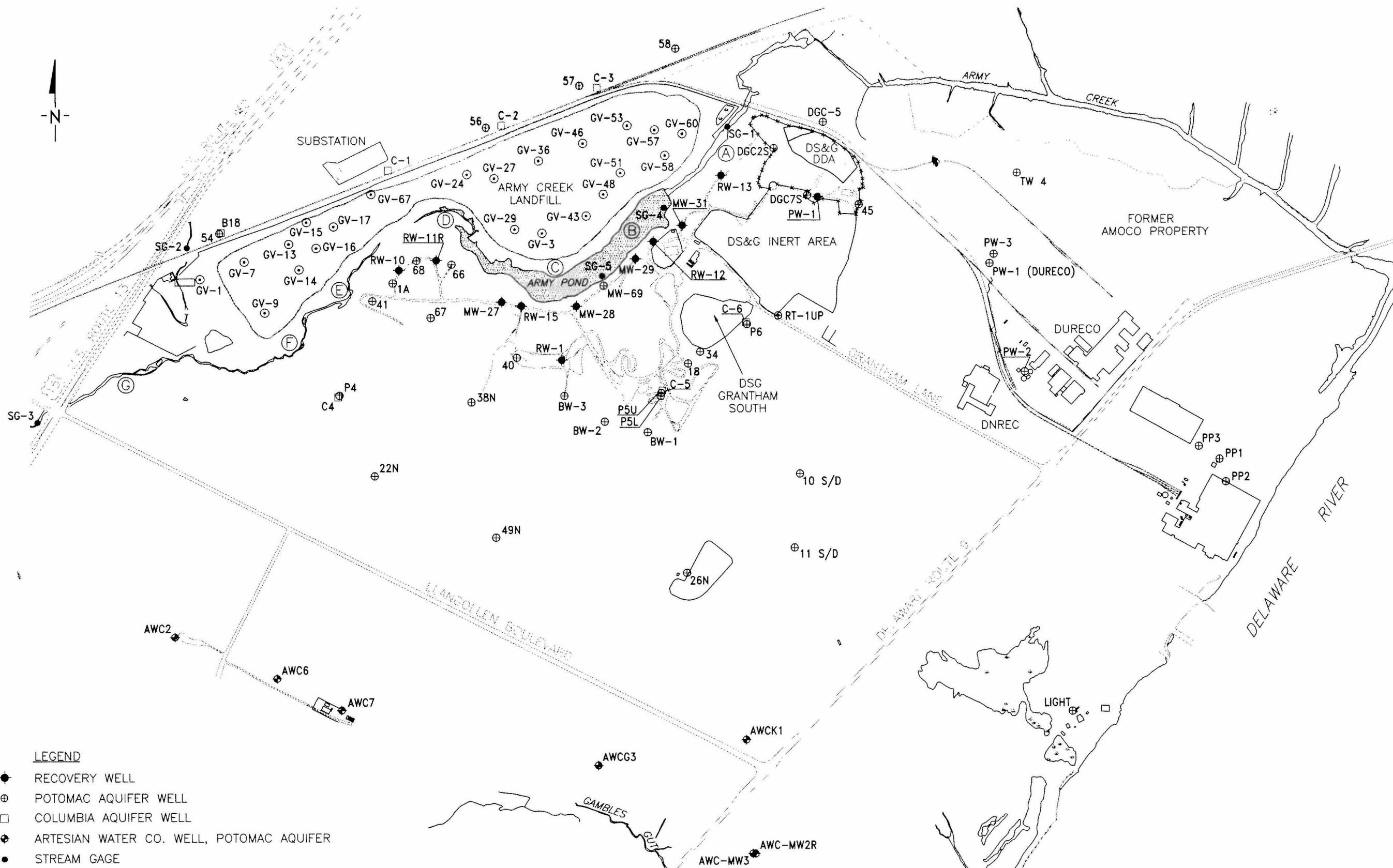
FILE NAME: ACL-002A.DWG

PROJECT NO: ACL

DWG DATE: 7-6-06

- LEGEND**
- RW-1 • RECOVERY WELL
  - 22 ⊕ POTOMAC AQUIFER WELL
  - B12 □ COLUMBIA AQUIFER WELL
  - AWC2 ♦ ARTESIAN WATER CO. WELL, POTOMAC AQUIFER
  - SG-2 • STREAM GAGE
  - CONRAIL RAILROAD
  - FENCE LINE
  - GV-1 ⊖ GAS VENT
  - (G) SURFACE/SEDIMENT SAMPLE SPOT

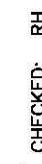
0 700 1400  
SCALE IN FEET



**RUTH ASSOCIATES, INC**  
8 East High Point Road  
Stuart, Florida 34996

**MONITORING LOCATIONS**  
Vicinity of Army Creek and  
Delaware Sand & Gravel Superfund Sites

FIGURE  
1



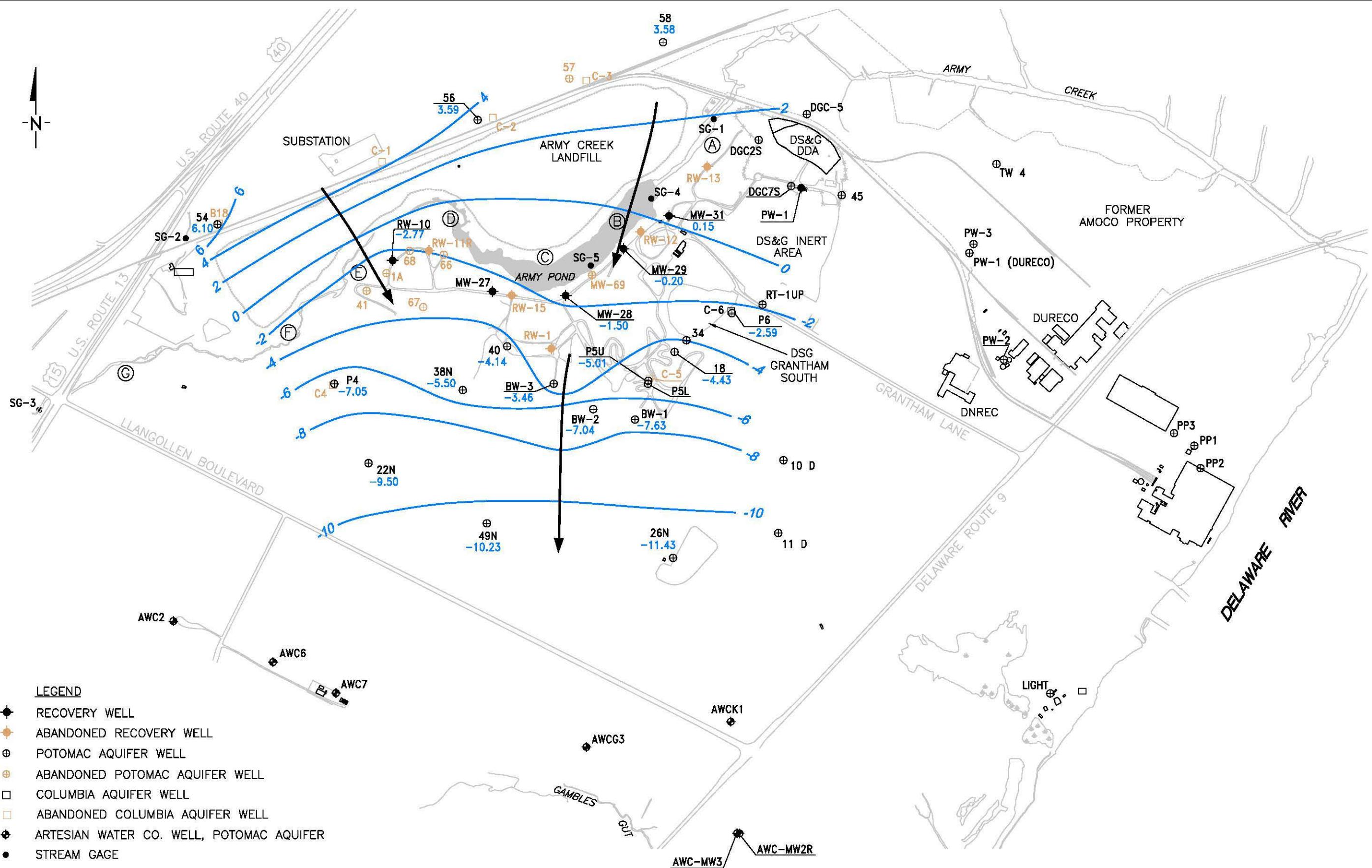
DRAFTER CP

ELE NAME: AC-218A DWG

PROJECT NO. 4C

5-14-10

DWG DATE:



**RUTH ASSOCIATES, INC**

8 East High Point Road  
Stuart, Florida 34996

GROUNDWATER ELEVATION MAP – APRIL 2010

## Vicinity of Army Creek and Delaware Sand & Gravel Superfund Sites

## FIGURE 2

CHECKED: MR

DRAFTER: CP

FILE NAME: ACL-219A.DWG

PROJECT NO: ACL

5-26-10

DWG DATE:

## NOTES:

- HISTORICAL DATA SHOWN IS A COMBINATION OF DATA COLLECTED ON BEHALF OF NCC AND THE DS&G REMEDIAL TRUST.
- UNITS IN MICROGRAMS PER LITER

RW-10	
4/02	0.018
7/02	0.04 U
10/02	0.05 U
1/03	0.02 J
4/03	0.046
7/03	0.05 U
10/04	0.054 U
1/05	0.019 U
4/05	0.02 U
7/05	0.02 U
10/05	0.018 U
1/06	5 U
4/06	5 U
7/06	5 U
10/06	5 U
1/07	5 U
4/07	5 U
10/07	5 U
4/08	6.9
10/08	5 U
4/09	5.1 U
10/09	5.3 U
4/10	5.1 U
10/09	5.3 U

MW-40	
7/02	1.1
10/02	0.041 J
1/03	0.7
4/03	0.8
7/03	0.2
10/04	2.5 J
1/05	0.26 B
4/05	0.14
7/05	0.083
10/05	0.019 U
1/06	0.57
4/06	0.46
7/06	0.33
10/06	0.24
1/07	0.043
4/07	0.018 U
10/07	5 U
10/08	5.3 U
10/09	5 U
4/10	5 U

P-4	
4/03	0.05 U
7/03	0.05 U
10/04	0.02 U
1/05	0.034 B
4/05	0.059
7/05	0.021 U
10/05	0.019 UL
1/06	5 U
4/06	5 U
7/06	5 U
10/06	0.018 U
1/07	5 U
4/07	5 U
7/07	5 U
10/07	5 UL
1/08	0.020 U
4/08	5 U
7/08	5 U
10/08	0.020 U
1/09	5.3 U
4/09	5.1 U
7/09	5 U
10/09	4.9 U
4/10	5 U

MW-22N	
7/03	0.05 U
10/04	0.017 J
1/05	0.032 B
4/05	0.039
7/05	0.02 U
10/05	0.02 UL
1/06	5 U
4/06	0.018 U
7/06	0.019 U
10/06	0.019 U
1/07	5 U
4/07	0.020 U
7/07	0.020 U
10/07	0.020 U
1/08	5.3 U
4/09	5.1 U
7/09	5 U
10/09	4.9 U
4/10	5 U

MW-49N	
10/04	0.87
1/05	0.032 B
4/05	0.017 U
7/05	0.021 U
10/05	0.02 UL
1/06	0.019 U
4/06	0.018 U
7/06	0.019 U
10/06	0.019 U
1/07	0.020 U
4/08	0.019 U
7/08	0.019 U
10/08	0.021 U
1/09	0.020 U
4/09	0.020 U
7/09	0.020 U
10/09	0.020 U
1/10	0.020 U
4/10	0.020 U

AWC7	
4/02	0.6
7/02	0.96
10/02	0.32
1/03	0.65
4/03	0.65
7/03	0.7
10/03	0.3
5/04	0.59
7/05	0.89
10/05	0.48
1/06	0.048
4/06	0.38
7/06	0.048
10/06	0.048
1/07	0.051
4/08	0.020 U
7/09	0.020 U
10/09	0.020 U
1/10	0.020 U
4/10	0.020 U

MW-28	
4/02	0.98
7/02	0.37
10/02	0.23
1/03	0.2
4/04	0.076
7/05	0.06
10/05	0.046
1/06	0.02 U
4/07	0.02 U
7/08	0.02 U
10/08	0.02 U
1/09	0.02 U
4/10	0.02 U

MW-29	
1/03	10
4/03	14
7/03	14 D
10/04	0.67
1/05	0.89
4/05	0.29
7/05	0.4
10/05	0.29
1/06	5 U
4/06	5 U
7/06	5 U
10/06	5 U
1/07	5 U
4/08	5 U
7/09	5 U
10/08	5.3 U
1/09	5.3 U
4/10	5.3 U

MW-31	
10/02	0.079
1/03	0.1
4/03	0.1
7/03	0.1
10/04	13
1/05	0.0095 J
4/05	0.019 J
7/05	0.099
10/05	0.018 U
1/06	5 U
4/07	5 U
7/08	5 U
10/08	5 U
1/09	5 U
4/10	5 U

DGC-5	
4/02	0.11
7/02	0.047 B
10/02	0.091
1/03	0.2
4/03	0.16
7/03	0.03 J
10/05	0.13
1/06	0.22
4/07	0.15
7/08	0.21
10/06	0.19
1/07	0.11
4/08	0.1
7/09	0.17
10/08	5 U
1/09	ND
4/10	ND

DGC-2S	
7/01	16
7/02	11
10/01	2.9
1/02	2.5
4/02	5 J
7/03	5.6
10/02	4 J
1/03	2
4/04	4.6
7/05	3.4
10/02	6.1
1/03	4 J
4/04	5.6
7/05	8 J
10/02	100
1/03	470
4/04	250 D
7/05	630
10/02	760
1/03	470 D
4/04	320
7/05	260

10

1000 JOURNAL OF CLIMATE

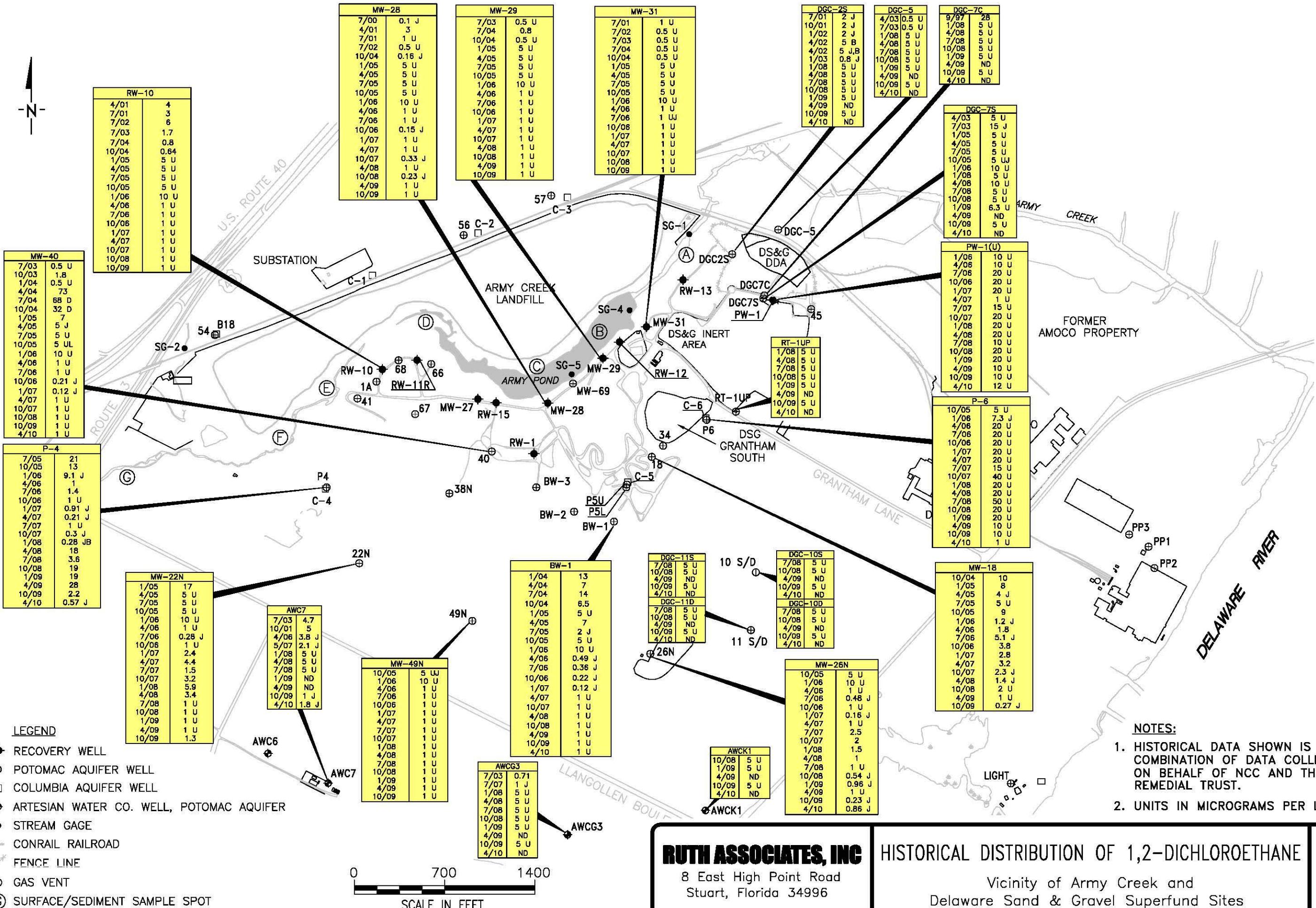
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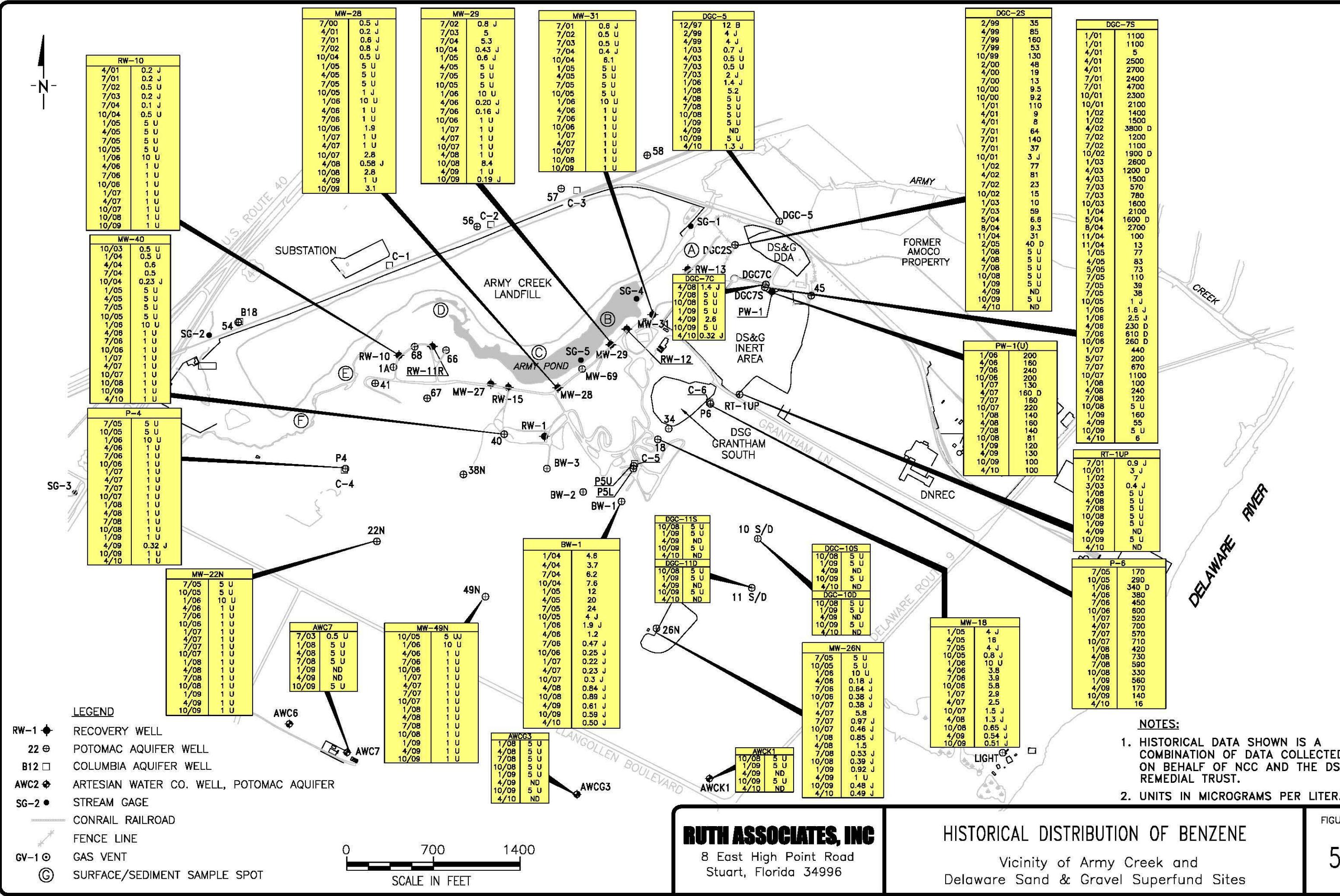
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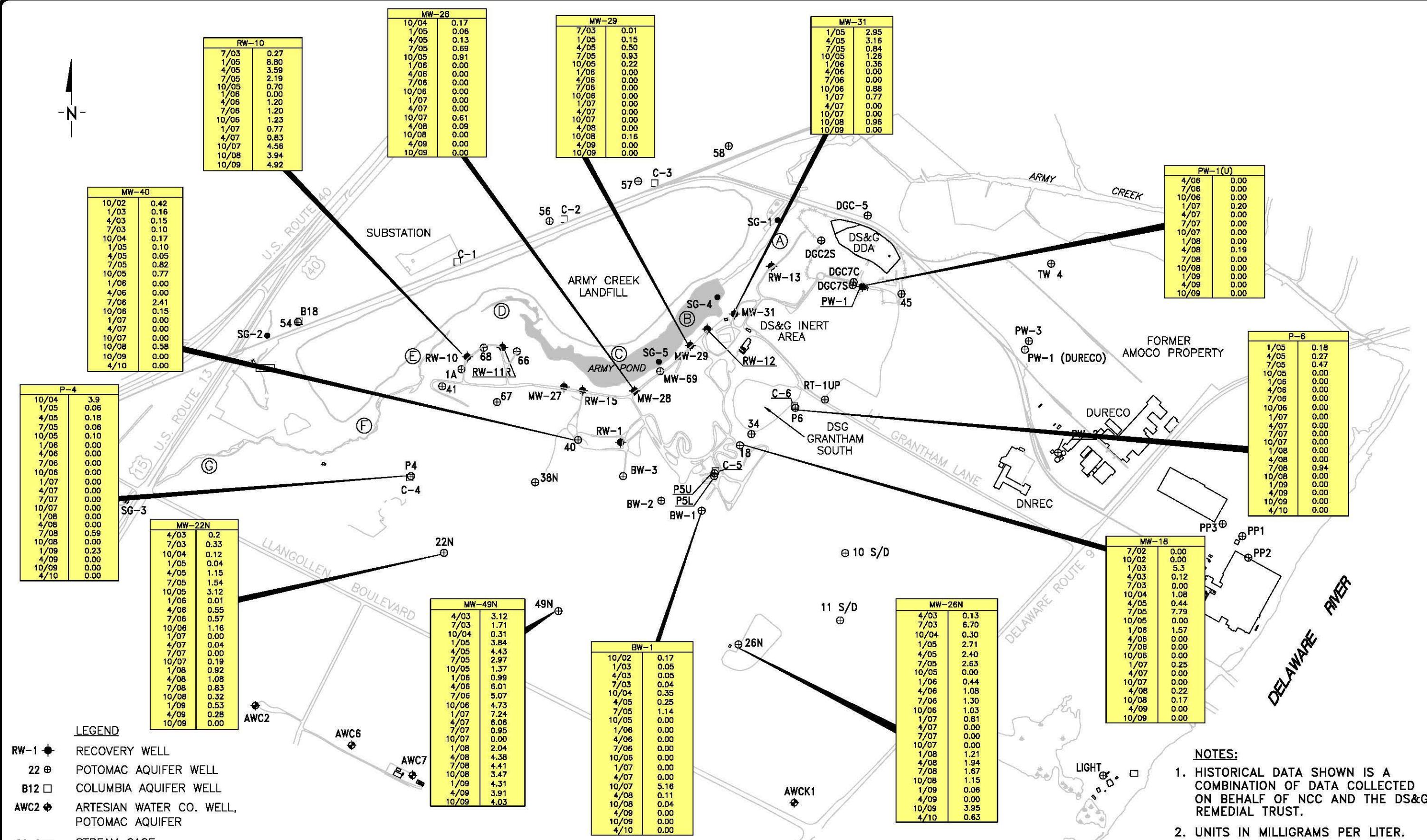
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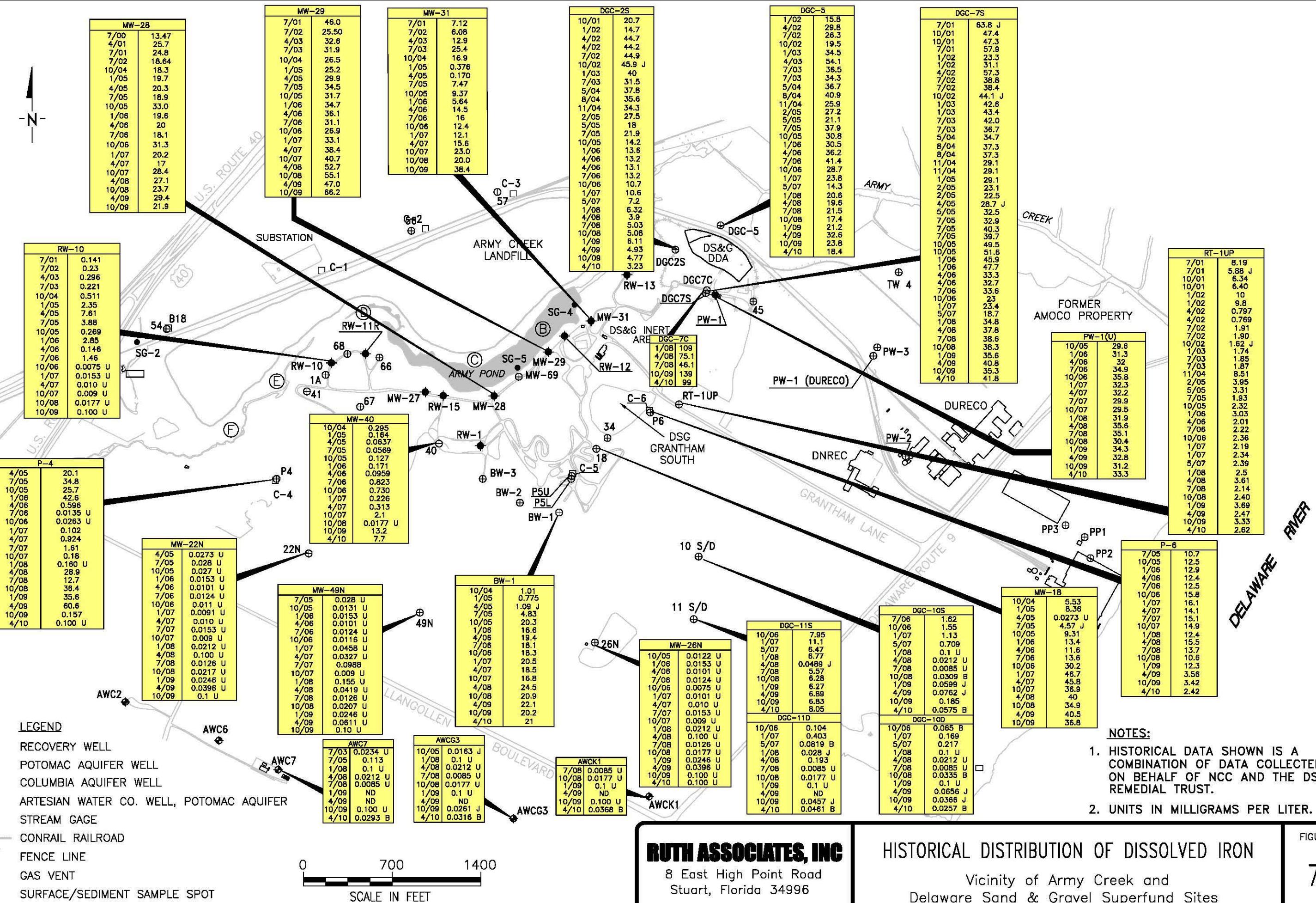
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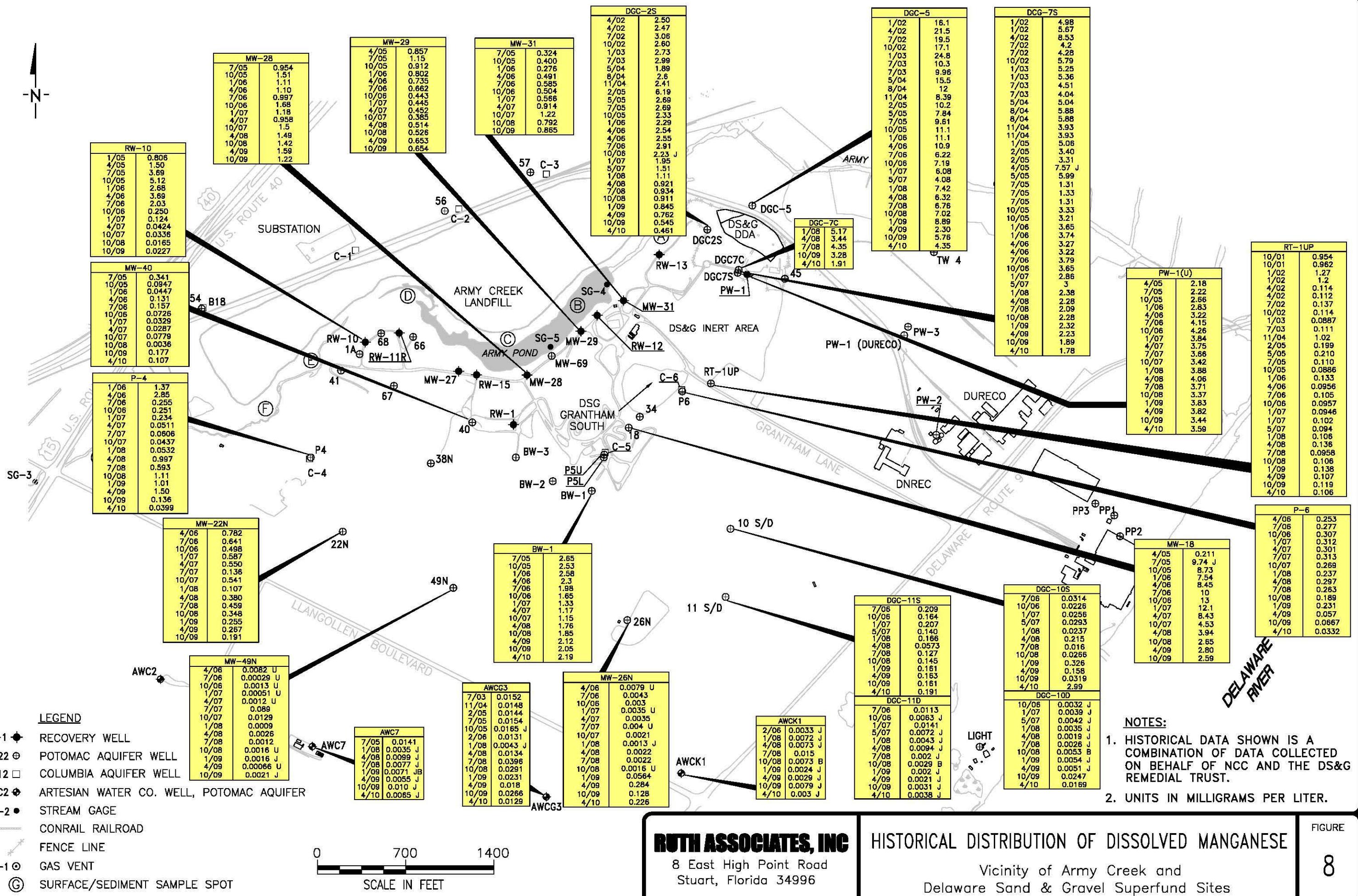
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# **APPENDIX A**

## **USEPA APPROVAL LETTERS**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

May 4, 2009

Mr. Michael Harris  
Department of Special Services  
New Castle County  
87 Reads Way  
Wilmington DE 19720

RE: Completion of Scope of Work-2  
Minor Modification to Operation & Maintenance Plan  
Army Creek Landfill Superfund Site

Dear Mr. Harris:

I am writing in response to a letter dated January 12, 2009, from Michele Ruth of Ruth Associates, Inc. on behalf of New Castle County (the County) requesting approval from the United States Environmental Protection Agency (EPA) to terminate Scope of Work-2 (SOW-2) as set forth in Exhibit 4 of the Army Creek Consent Decree (Civil Action Nos. 91-409 and 91-418). This confirms EPA's approval for the County to terminate SOW-2 subject to the following conditions.

The County will submit for EPA approval an addendum to the February 1992 Operations and Maintenance, Phase I plan in order to provide for long-term groundwater and stream monitoring, as outlined in attached Table 1 and Figure 1. This modification constitutes a minor modification of the studies required for the completion of Work-2, in accordance with Section XI.D of the Consent Decree.

EPA is also requiring implementation of a plan for the decommissioning or abandonment of various groundwater recovery and monitoring wells as outlined in attached Table 2, and the decommissioning of the groundwater recovery system and treatment plant. The well abandonment and decommissioning of the transmission system will be implemented in mid-2009. The treatment plant will be maintained until January of 2011 per EPA's request.

Please feel free to contact me if you have any questions regarding this matter.

Sincerely,



Debra Rossi  
Remedial Project Manager  
DE, VA, WV Remedial Branch

cc: John Cargill, DNREC  
Stacie Driscoll, EPA  
Cynthia Nadolski, Esq., EPA  
Michele Ruth, Ruth Associates  
Jim Webb, EPA  
George Weiner, Esq., Blank Rome

Attachments



*Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.*  
*Customer Service Hotline: 1-800-438-2474*

RUTH ASSOCIATES, INC.

**Table 1.**  
**Long-Term Monitoring Program**  
**Army Creek Landfill - New Castle, Delaware**

Monitoring Location	Annual Sampling	Semi-Annual Sampling	Semi-Annual Water Levels
RW-10	X		X
MW-28	X		X
MW-29	X		X
MW-31	X		X
BW-1	X	X	X
BW-2			X
BW-3			X
MW-40	X	X	X
P-4	X	X	X
P-5U			X
P-5L			X
P-6	X	X	X
MW-22N	X		X
MW-26N	X	X	X
MW-49N	X		X
MW-54			X
MW-56			X
MW-58			X
MW-18	X		X
PW-1	X	X	X
Surface Water	X		X
Sediments	X		

5/4/2009

Notes:

- (1) - Analytical parameters for groundwater to include volatile organic compounds, semi-volatile organic compounds, dissolved iron and manganese, and field parameters
- (2) - Field Indicator Parameters include temperature, specific conductance, pH, oxidation-reduction potential, and dissolved oxygen.
- (3) - Analytical parameters for surface water to include semi-volatile organics, TAL metals, pesticides and field parameters.
- (4) - Analytical parameters for sediments to include semi-volatile organics, TAL metals and pesticides.
- (5) - A complete round of water levels should be measured synoptically at all wells prior to the collection of samples.
- (6) - In the event that any monitoring point yields insufficient water, the order of sample-collection priority will be VOCs, semi-VOCs, dissolved iron and manganese, and field parameters.
- (7) - For groundwater, "Annual Events" to be conducted in October and "Semi-Annual Events" to be conducted in April.
- (8) - For surface water, "Annual Events" to be conducted in April.
- (9) - Monitoring frequency and the number of locations monitored may be reduced when results demonstrate stable quality.

RUTH ASSOCIATES, INC.

**Table 2**  
**Plan for Maintenance and Abandonment of**  
**Army Creek Landfill Wells**

Monitoring/Recovery Wells	Recommended Action
MW-1A	Abandon
MW-22N	Maintain for Monitoring
MW-26N	Maintain for Monitoring
MW-27	Decommission and Abandon
MW-28	Decommission but Maintain for Monitoring
MW-29	Decommission but Maintain for Monitoring
MW-31	Decommission but Maintain for Monitoring
MW-38N	Abandon
MW-40	Maintain for Monitoring
MW-41	Abandon
MW-49N	Maintain for Monitoring
MW-54	Maintain for Water-Level Monitoring
MW-56	Maintain for Water-Level Monitoring
MW-57	Abandon
MW-58	Maintain for Water-Level Monitoring
MW-66	Abandon
MW-67	Abandon
MW-68	Abandon
MW-69	Abandon
P-4	Maintain for Monitoring
P-5L	Maintain for Water-Level Monitoring
P-5U	Maintain for Water-Level Monitoring
P-6	Maintain for Monitoring
RW-1	Decommission and Abandon
RW-10	Decommission but Maintain for Monitoring
RW-11R	Decommission and Abandon
RW-12	Decommission and Abandon
RW-13	Decommission and Abandon
RW-15	Decommission and Abandon
B-18	Abandon after SVI Evaluation Completed
BW-1	Maintain for Monitoring
BW-2	Maintain for Water-Level Monitoring
BW-3	Maintain for Water-Level Monitoring
C-1	Abandon after SVI Evaluation Completed
C-2	Abandon after SVI Evaluation Completed
C-3	Abandon after SVI Evaluation Completed
C-4	Abandon
C-5	Abandon
C-6	Abandon after SVI Evaluation Completed by DS&G

4/20/09

Notes -

- 1) "Monitoring" can include water-level measurements or sampling.
- 2) "Decommission" refers to the removal of pumps, piping and other appurtenances.
- 3) "Abandonment" refers to removal of well, where possible, and grouting of borehole or well in-place.

CHECKED: MR

DRAFTER: CP

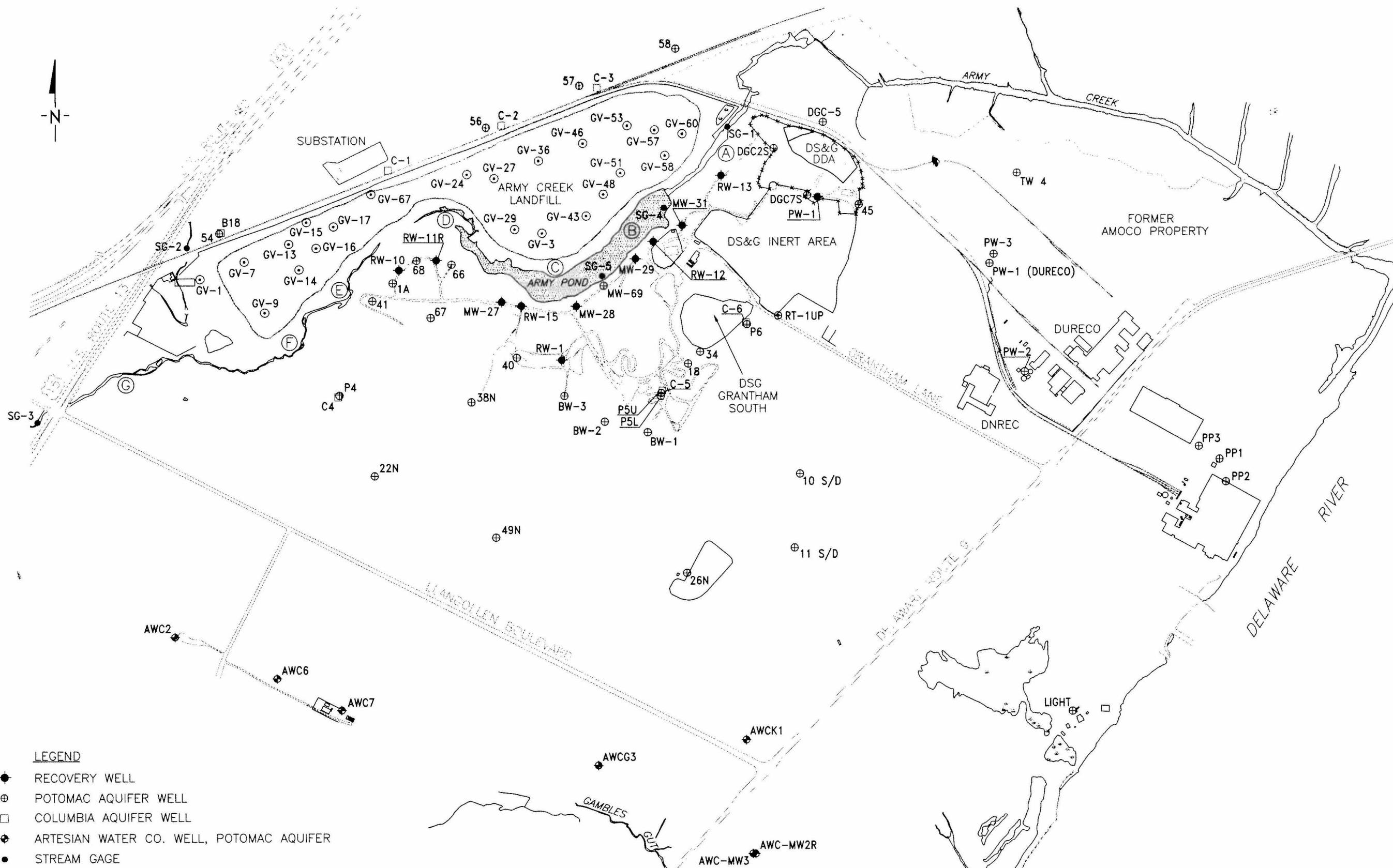
FILE NAME: ACL-002A.DWG

PROJECT NO: ACL

DWG DATE: 7-6-06

- LEGEND**
- RW-1 ● RECOVERY WELL
  - 22 ⊕ POTOMAC AQUIFER WELL
  - B12 □ COLUMBIA AQUIFER WELL
  - AWC2 ♦ ARTESIAN WATER CO. WELL, POTOMAC AQUIFER
  - SG-2 ● STREAM GAGE
  - CONRAIL RAILROAD
  - FENCE LINE
  - GV-1 ○ GAS VENT
  - (G) SURFACE/SEDIMENT SAMPLE SPOT

0 700 1400  
SCALE IN FEET



**RUTH ASSOCIATES, INC**  
8 East High Point Road  
Stuart, Florida 34996

**MONITORING LOCATIONS**  
Vicinity of Army Creek and  
Delaware Sand & Gravel Superfund Sites

FIGURE  
1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

October 28, 2009

Mr. Michael Harris  
Department of Special Services  
New Castle County  
87 Reads Way  
Wilmington DE 19720

RE: Approval of Revised Addendum to 1992 O&M Plan  
Army Creek Landfill Superfund Site

Dear Mr. Harris:

EPA approves Ruth Associates, Inc.'s October 8, 2009 Addendum to the 1992 Operation and Maintenance Plan with the understanding the lead monitoring will also be conducted at well 38N for a finite period of time.

Sincerely,

A handwritten signature in black ink, appearing to read "DR".

Debra Rossi  
Remedial Project Manager  
DE, VA, WV Remedial Branch

cc: John Cargill, DNREC  
Michele Ruth, Ruth Associates

# **APPENDIX B**

## **USEPA-APPROVED ADDEDUM TO O&M PLAN**

# RUTH ASSOCIATES, INC.

October 8, 2009

Ms. Debra Rossi  
Remedial Project Manager  
United States Environmental Protection Agency  
Region III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

RE: Army Creek Landfill - New Castle County, Delaware  
Revised Addendum to 1992 O&M Plan

Dear Ms. Rossi:

This addendum to the 1992 Operation and Maintenance (O&M) Plan has been prepared to outline the procedures that will be followed for the long-term groundwater and stream monitoring for the Army Creek Landfill, and has been revised to address comments outlined in the September 24, 2009 letter from the United States Environmental Protection Agency. This long-term monitoring program and the submittal of this plan are conditions for the Completion of SOW-2, as outlined in your letter of May 4, 2009. The purpose of this program is to support EPA's assessments of remedy performance and protectiveness as part of the Agency's five-year review process.

## Groundwater and Stream Monitoring Locations and Frequency

Groundwater and stream monitoring will be performed at the locations and frequency provided in the attached Table 1 and Figure 1. Stream monitoring will be conducted annually for a period of five years; surface-water elevations will be monitored semi-annually, synchronously with groundwater elevations. The long-term groundwater monitoring program may be modified based on monitoring results, contingent on approval by the United States Environmental Protection Agency.

## Procedures for Obtaining Water Elevations

Upon arrival at each well and prior to groundwater elevation measurement, the sampling personnel shall verify and record the well identification number on the field form. Prior to opening the well, the sampling personnel shall document any signs of tampering or well deterioration. A depth to groundwater measurement shall be taken using an electronic water level indicator. Personnel shall raise and lower the probe slightly about the water level a few times to determine accurate point of contact. Personnel shall measure and record the static water level read directly off the markings on the tape to the nearest 0.01 foot from the surveyed reference mark, as well as record the time and day of the measurement.

*Addendum to O&M Plan*

*Army Creek Landfill*

*October 8, 2009*

*Page 2 of 6.*

Surface-water elevations will be measured synchronously with groundwater elevations. Staff gauges will be used to measure the surface-water elevation at each of the monitoring locations. The depth to surface water will be measured from the surveyed mark on each staff gauge, and recorded on the field form.

**Sample Collection Procedures**

Surface-water samples are to be collected as grab samples using a decontaminated polyethylene beaker for sample collection. Samples will be poured directly from the sample collection beaker into the laboratory sample bottles, with the exception of TAL metals. The TAL metals sample will be pumped, using a peristaltic pump, from the sample collection beaker through a 0.45-micron filter into the laboratory bottle. New disposable polyethylene and silicon tubing and filter will be used for TAL metal filtering at each sampling location.

Sediment samples will be collected using stainless-steel utensils to collect sediments and place them directly into soil sampling jars for delivery to the lab.

Characteristics of the steam sample location (e.g., sediment and flow characteristics) at the time of sampling will be recorded on the field log form.

Groundwater sampling is to be performed generally in accordance with the USEPA paper "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures", and in accordance with this plan.

Wells are to be purged and sampled using either a peristaltic pump or decontaminated submersible pump. Typically wells with a depth to water (DTW) of less than 25 feet below the top of well casing (TOC) and/or well smaller than 2" diameter will be sampled with a peristaltic pump. Wells with a DTW of approximately 25 feet or more below TOC will be sampled with a dedicated submersible pump. In either instance, dedicated or new high-density polyethylene (HDPE) tubing shall be used in each well. If a peristaltic pump is used, a dedicated or new HDPE barb fitting and silicon tubing will also be used.

During well purging the DTW, pump flow rate and field parameter measurements will be collected at intervals of three minutes or more. The pump flow rate will be adjusted in an attempt to limit drawdown. The first field parameter measurements will not be collected until at least one volume of the pump, tubing and flow-through cell have been evacuated. Field parameters include pH, conductivity, dissolved oxygen, temperature and oxygen reduction potential. Purging will be considered complete when three consecutive reading meet all of the following stabilization criteria:

pH	+/- 0.1 SU
Conductivity	+/- 3%
Dissolved Oxygen	+/- 0.3 mg/l

*Addendum to O&M Plan*

*Army Creek Landfill*

*October 8, 2009*

*Page 3 of 6.*

Temperature	+/- 3%
ORP	+/- 10 mV

If it is determined that the stabilization parameters cannot be met, a sample may be collected at the discretion of field personnel and documentation of this deficiency shall be made on the log form.

Once purging stabilization has been achieved, the flow-through cell shall be detached from the pump discharge without affecting the pump flow rate. Pre-preserved sampling containers shall be filled directly from the pump tubing discharge. The pump flow rate should be the same as it was during purging. Field filters are to be used only for the collection of dissolved metals samples.

Once the requisite sample containers are filled, the tops should be securely closed and the samples immediately placed on ice. The samples are to be delivered under chain-of-custody to the laboratory.

Decontamination Procedures

Every effort will be made to use new or dedicated materials during sampling. In the event that this is not possible items will be thoroughly decontaminated between wells. Decontamination procedures shall include the use of an Alconox and de-ionized water mixture followed by a de-ionized water rinse.

Laboratory Analyses, Preparation and Analytical Methods, Preservation and Holding Time Information

All groundwater and surface-water samples will be preserved, prepared and analyzed using the methods identified in Table 2. All groundwater samples are to be analyzed for volatile organic compounds (VOCs) via USEPA Method SW846 8260B, prepared via SW846 5030B. Samples are to be collected in 40 milliliters (mL) VOA bottles preserved with hydrochloric acid (HCl). The sample holding time for VOCs is 14 days from sample collection.

All surface-water and groundwater samples are to be prepared and analyzed for Semivolatile Organic Compounds (SVOCs) via SOW for Organic Analysis, Low Concentration Water, Method SOM01.2. Samples are to be collected in unpreserved 1-liter amber glass bottles. The sample holding time for SVOCs is 7 days from sample collection to extraction and 40 days from extraction to analysis.

All surface-water samples are to be prepared and analyzed for dissolved TAL Metals via ILM05.4 methodology. Samples will be filtered through a 0.45 micron filter prior to

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collection in 500-mL plastic bottles preserved with nitric acid. The sample holding time for TAL Metals is six months (28 days for mercury) from sample collection.

All groundwater samples are to be prepared and analyzed for dissolved iron and manganese via ILM05.4 methodology. Samples from selected locations will also be analyzed for lead, utilizing the same methodology. Samples for metals analyses will be filtered through a 0.45 micron filter prior to collection in 500-mL plastic bottles preserved with nitric acid. The sample holding time for dissolved iron, manganese and lead is six months from sample collection.

All surface water samples are to be prepared and analyzed for pesticides via SOM01.2 methodology. Samples are to be collected in unpreserved 1-liter amber glass bottles. The sample holding time for pesticides is 7 days from sample collection to extraction and 40 days from extraction to analysis.

All sediment samples are to be collected and analyzed for SVOCs, TAL metals and pesticides. Samples are to be places into an 8 oz glass jar for delivery to the lab. SVOCs are to be prepared and analyzed via SOM01.2, with a holding time of 14 days from sample collection to extraction and 40 days from extraction to analysis. TAL Metals are to be prepared and analyzed via ILM05.4, with a holding time of 6 months (28 days for mercury) from sample collection. Pesticides are to be prepared and analyzed via SOM01.2, with a holding time of 14 days from sample collection to extraction and 40 days from extraction to analysis.

**Chain-of-Custody and Quality Assurance and Quality Control**

Once collected, all samples are to be kept under strict chain-of-custody (COC) procedures, documenting possession of the samples from collection to receipt by the laboratory. Quality assurance/quality control (QA/QC) samples shall be collected and analyzed in accordance with Table 3, and as described below.

Collect and analyze at least one Field Duplicate sample during each groundwater quality sampling event, collecting and analyzing at least one Field Duplicate for every consecutive group of twenty groundwater samples (or portion thereof). "Field Duplicate" shall mean a groundwater sample collected at the same time from the same monitoring location, following identical procedures but placed in separate container and labeled with a unique ID.

Collect and analyze at least one Matrix Spike/Matrix Spike Duplicate (MS/MSD) sample during each groundwater quality sampling event, collecting and analyze at least one MS/MSD for every consecutive group of twenty groundwater samples or portion thereof. MS/MSD shall mean a groundwater sample collected at the same time from the same groundwater monitoring well location, following identical procedures but placed in

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separate container. MS/MSD samples will be spiked and analyzed accordingly by the laboratory.

One Field Duplicate and MS/MSD will also be collected for each set of sediment and surface-water samples.

Collect and analyze at least one Field Blank sample during each groundwater quality sampling event, collecting and analyze at least one Field Blank for every consecutive group of twenty groundwater samples or portion thereof. The Field Blank should be poured (using the appropriate "blank" water: organic-free water for organic parameters and deionized water for inorganic parameters) at a sampling point, not using any of the field equipment, prepared and handled at the site in the same way as any other field sample whereby it must be stored, shipped and analyzed the same way as all other field samples.

Analyze at least one Trip Blank sample during each shipment of samples. A Trip Blank consists of laboratory distilled, de-ionized, analyte-free water in a closed, sealed sample bottle. The Trip Blank accompanies the empty sample bottles to the field, handled along with the field collected samples, and returned to the lab for analysis along with all other samples. One Trip Blank must be prepared by the sample analysis laboratory and analyzed upon return for each day of the sampling event. Trip Blanks evaluate potential sample contamination from VOCs that may be present in the air on-site or in sample shipping containers.

**Project Team**

Ruth Associates, Inc. (RAI) will coordinate the monitoring program, with primary responsibilities including the measurement of water-levels, the collection and shipment of samples, and reporting of the monitoring results. Test America Pittsburgh will perform the VOC analyses; Compuchem will perform all other laboratory analyses. LAB Validation will review the laboratory reports and report the validated data to RAI the data. RAI will incorporate the validated data to update chemical-quality databases, which will be presented in the report.

**Reporting**

A report will be prepared to present the methodologies employed and the findings of each semi-annual monitoring event. Groundwater and surface-water elevations will be tabulated, and chemical-quality databases will be updated. A graphical depiction of surface-water levels over time will be presented. Temporal trend analysis of selected contaminants in groundwater and surface water will also be presented. Characteristics of the surface-water/sediment sampling locations will be described, as well as any other noteworthy observations of the groundwater sampling locations.

\* \* \* \* \*

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We trust you will find this O&M Plan Addendum adequate to meet your requirements.  
Please do not hesitate to contact us if you have any questions.

Sincerely,

RUTH ASSOCIATES, INC.

A handwritten signature in black ink that reads "Michele C. Ruth". The signature is fluid and cursive, with "Michele" on top, "C." in the middle, and "Ruth" on the bottom right.

Michele C. Ruth, PE  
President

Attachments

cc: Michael Harris, NCC  
Michael Barbara, ACL Remedial Trust  
George Weiner, BR

**Table 1.**  
**Long-Term Monitoring Program**  
**Army Creek Landfill - New Castle, Delaware**

Monitoring Location	Annual Sampling	Semi-Annual Sampling	Lead Analysis	Semi-Annual Water Levels
RW-10	X			X
MW-28	X			X
MW-29	X			X
MW-31	X			X
BW-1	X	X		X
BW-2				X
BW-3				X
MW-40	X	X	X	X
P-4	X	X		X
P-5U				X
P-5L				X
P-6	X	X		X
MW-22N	X		X	X
MW-26N	X	X		X
MW-49N	X		X	X
MW-54				X
MW-56				X
MW-58				X
MW-18	X			X
PW-1	X	X		X
Surface Water	X			X
Sediments	X			

10/3/2009

## Notes:

- (1) - Analytical parameters for groundwater to include volatile organic compounds, semi-volatile organic compounds, dissolved iron and manganese, and field parameters, plus lead for the locations indicated.
- (2) - Field Indicator Parameters include temperature, specific conductance, pH, oxidation-reduction potential, and dissolved oxygen.
- (3) - Analytical parameters for surface water to include semi-volatile organics, TAL metals, pesticides and field parameters.
- (4) - Analytical parameters for sediments to include semi-volatile organics, TAL metals and pesticides.
- (5) - A complete round of water levels should be measured synoptically at all wells prior to the collection of samples.
- (6) - In the event that any monitoring point yields insufficient water, the order of sample-collection priority will be VOCs, semi-VOCs, dissolved iron and manganese, and field parameters.
- (7) - For groundwater, "Annual Events" to be conducted in October and "Semi-Annual Events" to be conducted in April.
- (8) - For surface water, "Annual Events" to be conducted in April.
- (9) - Monitoring frequency and the number of locations monitored may be reduced when results demonstrate stable quality.

Table 2  
Analytical Methods  
Long-Term Monitoring Program  
Army Creek Landfill - New Castle, Delaware

Analyte	Analytical Method	Preparation Method	Sample Holding Time
VOCs (Groundwater)	SW 846 - 8260B	SW 846 - 5030B	14 days from collection
SVOCs (Surface Water and Groundwater)	SOM01.2	SOM01.2	7 days from collection to extraction 40 days from extraction to analysis
TAL Metals (Surface Water)	ILM05.4 <sup>a</sup>	ILM05.4 <sup>a</sup>	6 months from collection (28 days for mercury)
Pesticides (Surface Water)	SOM01.2	SOM01.2	7 days from collection to extraction 40 days from extraction to analysis
Dissolved iron, manganese and lead (Groundwater)	ILM05.4 <sup>a</sup>	ILM05.4 <sup>a</sup>	6 months from collection
SVOCs (Sediments)	SOM01.2	SOM01.2	14 days from collection to extraction 40 days from extraction to analysis
TAL Metals (Sediments)	ILM05.4 <sup>a</sup>	ILM05.4 <sup>a</sup>	6 months from collection (28 days for mercury)
Pesticides (Sediments)	SOM01.2	SOM01.2	14 days from collection to extraction 40 days from extraction to analysis
Temperature, conductivity, pH, ORP and dissolved oxygen	Measured in the field with multi-parameter instrument (Horiba U-22 or similar)		

VOCS - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds

<sup>a</sup> - Method ISM01.1 will replace Method ILM05.4 when it is approved by EPA

Table 3  
Quality Assurance and Quality Control Samples  
Long-Term Monitoring Program  
Army Creek Landfill - New Castle, Delaware

QA/QC Sample	Sample Frequency
Field Duplicate	Minimum of one per event. One for every 20 groundwater samples (or portion thereof). One for every 20 surface water samples (or portion thereof). One for every 20 sediment samples (or portion thereof).
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Minimum of one per event. One for every 20 groundwater samples (or portion thereof). One for every 20 surface water samples (or portion thereof). One for every 20 sediment samples (or portion thereof).
Field Blank	Minimum of one per event. One for every 20 groundwater samples (or portion thereof).
Trip Blank	Minimum of one per event. One for every day VOC samples are shipped.

CHECKED: MR

DRAFTER: CP

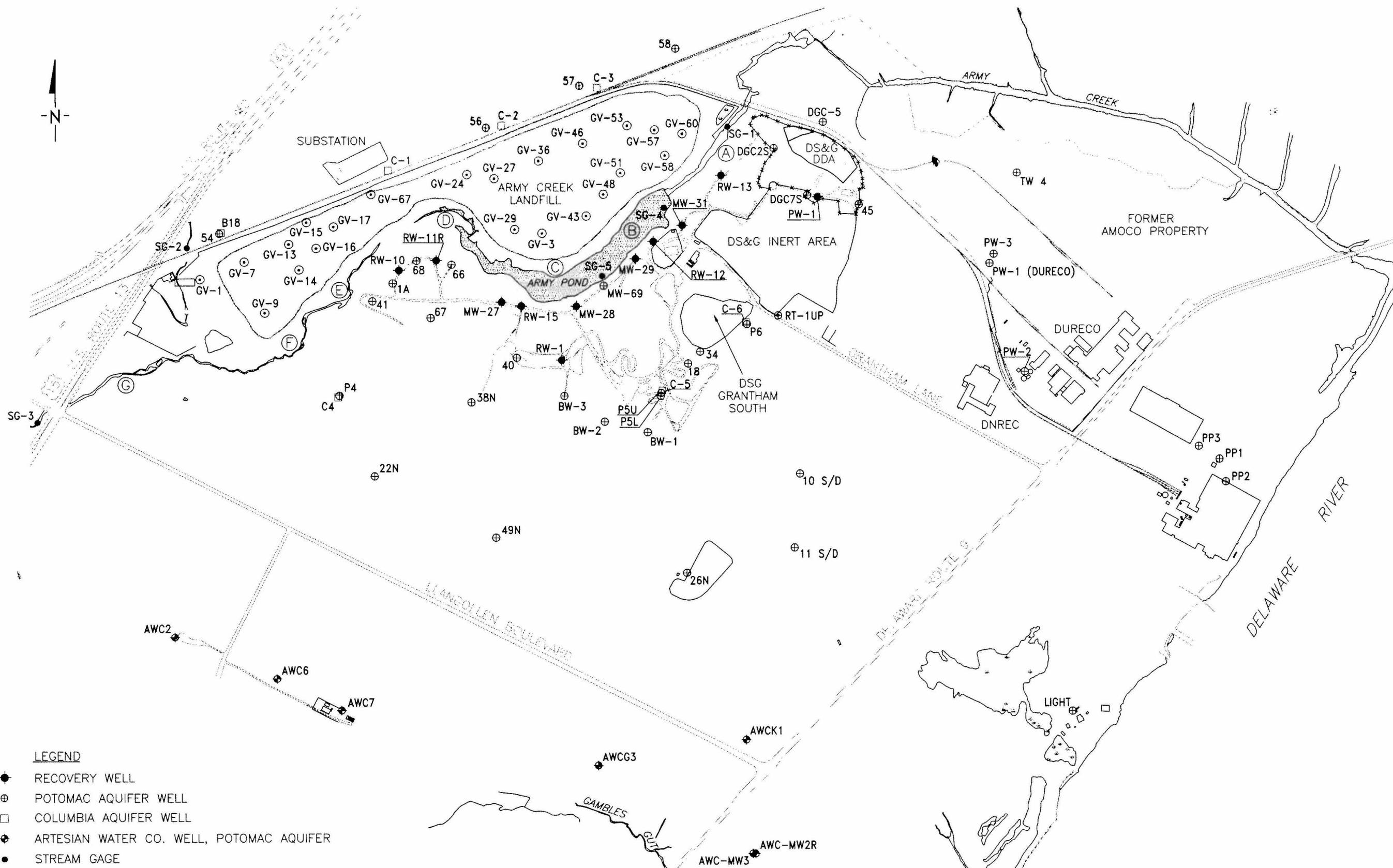
FILE NAME: ACL-002A.DWG

PROJECT NO: ACL

DWG DATE: 7-6-06

- LEGEND**
- RW-1 ● RECOVERY WELL
  - 22 ⊕ POTOMAC AQUIFER WELL
  - B12 □ COLUMBIA AQUIFER WELL
  - AWC2 ♦ ARTESIAN WATER CO. WELL, POTOMAC AQUIFER
  - SG-2 ● STREAM GAGE
  - CONRAIL RAILROAD
  - FENCE LINE
  - GV-1 ○ GAS VENT
  - (G) SURFACE/SEDIMENT SAMPLE SPOT

0 700 1400  
SCALE IN FEET



**RUTH ASSOCIATES, INC**  
8 East High Point Road  
Stuart, Florida 34996

**MONITORING LOCATIONS**  
Vicinity of Army Creek and  
Delaware Sand & Gravel Superfund Sites

FIGURE  
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